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ENGRAVING

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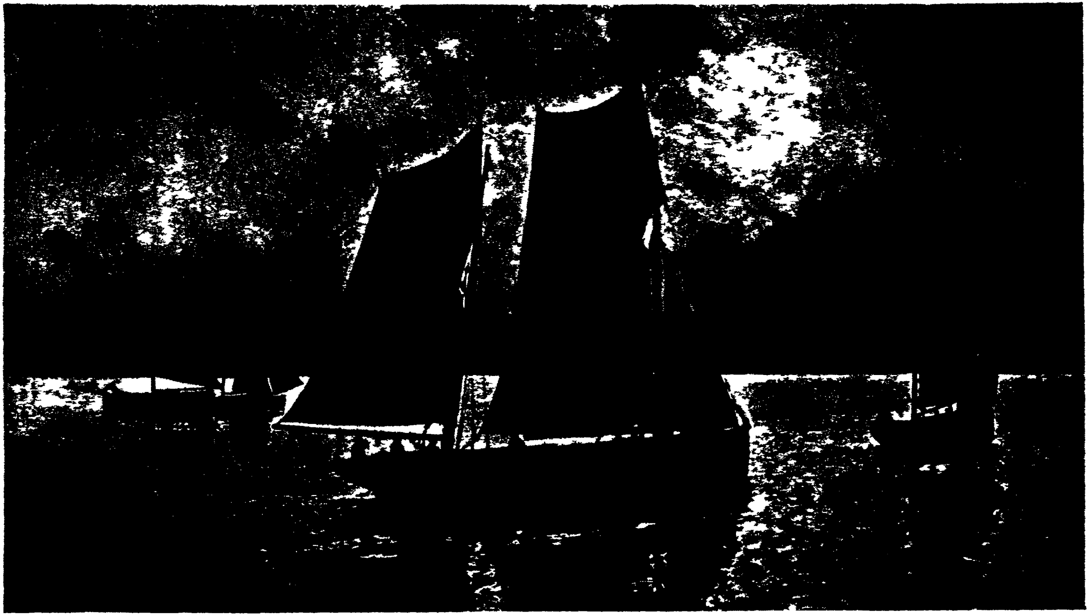

From the original Mezzotint by T. W. Lascelles “LOWESTOFT FISHING BOATS” *Frontispiece*

PITMAN'S COMMON COMMODITIES
AND INDUSTRIES

ENGRAVING

T. W. LASCELLES

WITH TWO ILLUSTRATIONS
BY THE AUTHOR

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ENGRAVING

CHAPTER I

A SKETCH OF THE HISTORY OF ENGRAVING

ENGRAVING is the art of cutting lines, designs, objects, inscriptions, on any suitable substance, such as stone, metal, wood, bone, ivory, etc.

Some of the branches of the art are of great antiquity. The Egyptians engraved their ornaments, their statues, obelisks, mummy cases, and other things. Cleopatra's Needle is a standing example of engraving on stone. The reader may say, "But Cleopatra's Needle is carved." Well, if it is, so are all the earlier woodcuts, and it would be possible to take an impression from Cleopatra's Needle either in surface or in intaglio printing. This is the reason for calling it engraving.

The first engravings for the purpose of taking impressions or prints of the design engraved, cut, or carved were upon wood. Playing cards were, in all probability, the first kind of engraving either on wood or on metal. The earliest engraving (dated 1423) was "St. Christopher bearing the Infant Christ," measuring 11½ by 8½ in. A print or proof, which was no doubt taken by hand and afterwards tinted in colours, was discovered by Heinecken (a collector of engravings) in the library of the Convent of Buxheim in Swabia. It was pasted inside the binding of a manuscript (*Laus Virginis*). Mr. W. J. Linton, one of the nineteenth century masters of wood engraving, and author of *The Masters of Wood Engraving*, writes: "I am well content to give some words of unstinted praise to our St. Christopher for the design"; and finishes by saying, "I can forgive all shortcomings; these old-century men were in earnest." The manuscript has another print, "The Annunciation," pasted on the end cover. It is similar in size to the St. Christopher, and is printed in a dark-coloured ink. This is attributed by some to the same period, but by others is thought to belong to a totally different school. This manuscript is now in the Spencer Library at Manchester. There is also in the library another print about the same period ("St. Bridget of Sweden"), which is coloured by hand. Heinecken writes: "Having visited a great many convents in Franconia, Swabia, Bavaria, and in the Austrian States, I everywhere discovered in their libraries many of these kinds of figures engraved on wood. They were usually pasted either at the beginning or the end of old volumes of the fifteenth century. These facts have confirmed me in my opinion that the next step of the engraver on wood, after playing cards, was to engrave the figures of Saints."

Papillon states that the earliest wood engravings were by Cavaliere Alberico Cunio and his sister Isabella (1284). They engraved upon wood with a knife "The Chivalrous Deeds of Alexander the Great," printed copies of which were distributed among their relatives, and one given to Pope Honorius IV. Abbé Zani and Emeric David have both admitted their authenticity, although the prints have vanished.

About the first part of the fifteenth century many books were printed on one side of the paper only, with illustrations engraved on wood (in line). The lettering was also engraved in one piece. Some of the illustrations are about 10 by 8 in.; these are known as block books (the wood engravings being called blocks), as the *Speculum Humanae Salvationis* ("Mirror of

Salvation"), *Biblia Pauperum* ("Bible of the Poor"), and *Apocalypsis Sancti Johannis* ("Visions of St. John").

There are many block books in the Spencer Library, Manchester, the Bodleian Library, Oxford, and the British Museum Library. The prints are all nameless as to designers or engravers, and were executed in line or with very little shading, and no doubt they were intended for colouring by hand. One of the first books of importance printed on a press and from movable type was the celebrated Bible produced by Gutenberg at Mentz about 1455. A copy of this work (which is very scarce) fetched £3,900 at the Theobald Sale in 1884, being bought by Quaritch. The first known book printed from woodcuts and type is the *Speculum Humanae Salvationis*. The woodcuts are printed in brown ink, and the type is printed in black; this would allow the cuts to be coloured with more effect.

THE INVENTION OF PRINTING FROM MOVABLE TYPE

Gutenberg, Johannes or Henne (originally Gensfleisch), born in Mainz about 1400, died 1468.

Coster (Laurens Janszoons), or Koster, of Haarlem, is stated by Hadrianus Junius in his *Batavia* (1588) to have invented the art of printing with movable type. Henry Morley in *English Writers, VI* (p. 279), says: "There is no mention of Coster as a printer earlier than the year 1550."

Ulrich Zell, the first printer established in Cologne by Gutenberg, contrasts the process practised in the Low Countries before the second half of the fifteenth century with the improved process of Gutenberg, and also states that the first step taken in the invention was in the printed copies of Donatus about 1440. Even if this date is correct, the marked improvement made by Gutenberg establishes his name as the recognized inventor of the art of printing with movable type (it must be understood here that movable type means that each letter is engraved separately), and the works published by Gutenberg, *Letters of Indulgence*, the Bible, etc., are superior to anything produced in the Low Countries.

Joseph Cundall states in his history of wood engraving that it is owing to the rival claims of two Archbishops that the city of Mentz was sacked. Gutenberg's partners, Fürst and Peter Schoeffer, and his assistants were scattered, and a few years afterwards printing presses were in use in most of the large towns in Germany, Netherlands, Italy and France, and also by Caxton in London about fifteen years later. In 1459 Fürst and Schoeffer printed at Mentz *The Psalter*. This is the best printed book of the period; the initial letters printed in red and blue were probably designed and engraved by Schoeffer.

In 1486 *Bridenbach's Travels* was printed by Erhard Renwich. The frontispiece is a distinct improvement in the art of wood engraving, cross hatching being used in the shadows; the design also has more imagination. The designer and engraver are unnamed.

At this period designing and engraving were showing considerable advance.

William Caxton (born in Kent about 1422, died at Westminster 1491) was the first English printer. Apprenticed as a mercer in London, he went to Bruges about 1465, became Governor of the English Association of Merchant Adventurers, and translated *Recueil des Histoires de Troye*. De Vinne, in *The Invention of Printing* (p. 507), says: "The first book printed in English, the *Recuyell of the Historyes of Troye*, a stout folio of 351 leaves, does not contain the date of printing nor the name or place of the printer." Caxton returned to England in 1476, set up a printing press at Westminster, and was constantly engaged in translating and printing until his death. Wynkyn de Worde, one of his assistants, became his successor in 1491, and lived in Fleet Street from about 1502 till the time of his death (about 1535).

Niello Engraving

A plate of silver, cup or chalice, has its surface previously engraved in intaglio to form a design or pattern. The engraving is then filled in with a black alloy, and the whole polished to one surface. The process was also reversed to give a silver design on a black surface.

Impressions were taken from niello engravings before filling in. These impressions could have been taken either as intaglio or as surface impressions, and it is throught that the art of engraving on metal originated from such impressions in the fifteenth century by Maso Finiguerra, the Florentine goldsmith, about 1452. It is also stated by De Vinne (*Invention of Printing*) that prints by this method were made in Germany as early as 1446. Zani found (1797) in the print room of the Paris Library an impression of a niello before the plate was filled in. It is a Pax, and measures 130 by 87 mm. (*i.e.*, about $5\frac{1}{8}$ by $3\frac{7}{16}$ in.). The plate was engraved by the goldsmith Tomaso or Maso Finiguerra. The original niello is in the Uffizi (Florence), the subject being the Coronation of the Virgin. The print is called a niello.

Although, as already stated, the niello plates before filling in could have been either intaglio or surface printing, Finiguerra does not appear to have used the art for printing, and it was some years afterwards that Baccio Baldini, Botticelli, and Pollajuolo, with others, started the Florentine school of engraving. Germany, however, was profiting from the discovery of Finiguerra. The *Sibilla Cumana* is a typical specimen of Baccio Baldini's work at the beginning of the sixteenth century.

Andrea Mantegna, the celebrated Italian historical painter and engraver, engraved about twenty plates, historical, religious, and mythological; among them "The Entombment" and "The Triumph of Julius Caesar," which are far more vigorous than the Florentine school.

Sandro Botticelli, born Alessandro Filippi at Florence, painter of many beautiful pictures and engraver, designed a series of illustrations for the *Divina Commedia* of Dante, the majority of which are in the museum in Berlin, and a few in the Vatican. Ruskin speaks of him as the greatest of all Southern engravers. He was a follower of Savonarola and died in poverty.

Aldus Manutius, or Aldro Manuzio (born in Bassiano, Italy, in 1450, died in Venice in 1515), an Italian classical scholar and celebrated painter, founded the Aldine Press in Venice about 1490. He published the Greek classics and Latin and Italian works. Wood engraving in France was of about the same quality as the Italian of this period. In 1499 Manutius printed in Venice the *Hypnerotomachia Poliphili* (" Dream of Poliphilo "). The designs are poor for Italian art, and the engravings are not so good as the German of the same period. An abridged copy of this work was printed in London for Simon Waterson in 1592. Kerver printed a French edition, with French illustrations, in 1561.

Wood engraving and intaglio were of a very poor description before the Master, an anonymous artist, founded a German school of engraving. Martin Schongauer, born in Kolmar, Alsace, an historical painter and engraver, is said to have been the greatest German engraver of the fifteenth century: "Jesus Betrayed by Judas," "The Entombment," "The Flight into Egypt," etc. Schongauer was called the Master of Kolmar, and his influence extended all over Germany, also to France and Italy. Even Michel Angelo painted a "Temptation of St. Anthony" from one of Schongauer's engravings.

At this period in Germany great advancement was made in line engraving (intaglio). Wood engraving, however, stood still. The Italian school of wood engraving was considerably better (see *The Decameron*, 1492), and it was not until the time of Albrecht Dürer, the great master of wood engraving in Germany, who published his first work about 1496, that wood engraving began to show any great improvement. Dürer, who was born in Nuremberg in 1471 and died there in 1528, was a famous painter and engraver and the founder of the German school of wood engraving. The son of a goldsmith, he worked at that art for his father, and was apprenticed to Michael Wolgemuth from 1505 to 1507. He visited Venice, where the engravings of Mantegna much impressed him. Returning to Nuremberg, he became Court painter to the Emperor Maximilian. It is also stated that he was the inventor of etching. As a wood engraver and designer he has a higher reputation than as a painter. There are about two hundred woodcuts attributed to him: "The Apocalypse" (sixteen cuts), "The Greater and the Lesser Passion" (forty-nine cuts), etc. His copper plates number about one hundred: "Death of the Devil," "Melancholia," "The Little Passion" (sixteen plates), etc.

Hans Holbein (1497–1543), Bavarian portrait painter and wood engraver, son of Hans Holbein (1460–1524). The series of designs for *The Dance of Death* was engraved on wood by Hans Lützelburger, published 1538 to 1547. This series is known as the Holbein wood engravings. Holbein came to England first about 1526 or 1527. In 1528 he went back to Basle, and returned to England in 1532 and became portrait painter to Henry VIII. About 1536 he painted many portraits and religious subjects, also "The Ambassadors" in the National Gallery, 1533. His death occurred in London in 1543.

In England from 1540 to 1545 maps were engraved in line by Cole and Ryther.

From 1589 to 1604 William Rogers engraved a number of portraits. The full-length one of Queen Elizabeth is perhaps the best example.

Simon Van de Passe, the Dutch engraver, his father and brother William, helped the development in England with a school of engravers. Payne, one of their students (1616–1691), was noted especially for his portraits, as was his son (1656–1700).

In 1623 Martin Droeshout engraved the portrait of Shakespeare for the first collected edition of his "Comedies, Histories, and Tragedies." Born in London in 1601, he was the son of Michael Droeshout, also an engraver.

William Marshall was the most prolific of the engravers of the first half of the seventeenth century. At this time Robert Van Voerst, Lucas Vorsterman, and Cornelis Van Dalen, the Flemish engravers, were working in England.

Robert Vaughan, in the year Cromwell died, published a print called "An Age for Apes," in which he clothed ape-like figures in the costumes of the day.

George Glover and William Faithorne, pupils of John Payne, were greatly influenced by Vorsterman, who, while working in the employment of the Earl of Arundel and the King, engraved "Thomas Duke of Norfolk," after Holbein, and " St. George and the Dragon," after Raphael. These engravings were such a revelation to the two Englishmen that Glover at once executed a few fine portraits: " Sir Edward Dering," after Cornelis Janssen, " John Pyon," after Edward Bower, and " Sir Thomas Urquhart."

Peter Lombart, a Dutch engraver, who studied and worked in Paris, came to London in 1648. He engraved, after Vandyck, " The Countess of Morton," " Countess of Devonshire," " Lucy the Countess of Carlisle," and others; he also engraved Vandyck's well-known picture of Charles I. Prints from this plate sometimes have Cromwell's head in place of Charles and changed again, an old practice of the early engravers, who used their plates over and over again to represent other people, sometimes changing only the head and the title. Some were done for political reasons, and some through death. Lombart engraved many portraits before he returned, in 1662, to Paris, where he died.

William Faithorne, who was the first great master of line engraving, raised engraving to its place in Art, equal to any work being done in France, Italy, or Germany. To quote Faithorne's own words, " The result of air, the symmetry of parts, the exact harmony of proportions, of lights and shadows, may be performed to the height in Graving."

Ludwig Von Siegen published a print in mezzotint engraving in 1642 (the portrait of Princess Amelia Elizabeth of Hesse). Twelve years afterwards he revealed the method to Prince Rupert.

Prince Rupert, Prince of the Palatinate, born in Prague in 1619, died in 1682, third son of the elector Palatine Frederick V and Elizabeth Stuart, daughter of James I of England, in 1654 introduced the art of mezzotint into England. His engraving of " The

Executioner of St. John the Baptist" is an example: a figure holding in his outstretched hand a severed head, after Jusepe Ribera, called Spagnoletto. Rupert fought for his uncle, Charles I of England, in the Civil Wars as a cavalry leader, and it is rather curious that he should have chosen such a prophetic subject to mezzotint. There is a story told by Horace Walpole to the effect that Prince Rupert, whilst watching a soldier cleaning the barrel of his musket, which had become rusty through being on sentry-go all night, noticed that, as the soldier cleaned off the rust, there remained a pattern pitted into the steel, and from this he conceived the idea of mezzotint engraving. This is a pretty story, but Prince Rupert did not invent mezzotint, or mezzotinto as it was then called.

William Sherwen was initiated in the art by Prince Rupert, and a dated mezzotint, a portrait of Charles II (1669), established him as the first Englishman to practise the art.

Francis Place, born in 1647, engraved in mezzotint a portrait of Charles I after Vandyck and others, all possessing considerable charm.

Abraham Blooteling, a Dutch line engraver, born in Amsterdam in 1634, studied the art of mezzotint and considerably improved the method by inventing the rocker for laying the ground. By this method the grain was made finer and the tones were made richer. His portraits of the Duke of Monmouth, the Duchess of Portsmouth, Catherine of Braganza, and Charles II showed so much advance in technique, skill, and drawing that Lely must have been astonished at the improvement on his own paintings.

Portraiture in mezzotint was becoming very fashionable at this period. The Duchesses of the Court of Charles II were all engraved, and a pretty collection they make ; also Nell Gwyn and Moll Davis, the actress and dancer. These portraits were engraved mostly by Dutch engravers, who kept the secret of mezzotinting to themselves. However, Edward Luttrell, an Irishman, was so charmed by the art that he set out to teach himself, and whether he purchased the secret through Lloyd, the print-seller, or from Blois, one of the Blooteling's ground-layers, for forty shillings, or whether he obtained it from Paul Van Somer, the Dutch engraver, he certainly learnt the whole process of mezzotint, and afterwards introduced Isaac Beckett, born in 1652, to Lloyd, who entered into a business agreement with him. Beckett, who became the first English mezzotint engraver, a man of artistic instinct and charming technique, married a lady with money, and set himself up as a print-seller at the Golden Head in the Old Bailey. He engraved after Kneller's portraits and other artists of his time. Most of his engravings were done between 1681 and 1688. "Lady Williams" is considered his masterpiece by connoisseurs.

Robert Williams, a Welshman and a pupil of Theodore Freres, a Dutch painter, engraved with a painter's touch and boldness his mezzotint plates of Thomas Betterton the actor, Margaret Hughes the actress (for whom Prince Rupert forsook his studies), Admiral Sir George Rooke (who gave England Gibraltar), and "Vanitas Vanitatum," the girl blowing soap-bubbles.

In the reign of William and Mary mezzotinting in England was dominating the print-selling world.

William Faithorne (son of the great line engraver) engraved some good portraits.

Bernard Lens, born in London in 1659, appears to have been the first mezzotinter to produce pictorial effect, as shown in his nocturne "Fireworks in St. James's Square."

Then comes the master of the period, John Smith, born at Daventry in 1652 and a pupil of Tillet, Van der Vaat and Beckett. Kneller, charmed with his work, invited him to live in his house and engrave his pictures as he painted them. Smith worked for the print-sellers, G. Beckett and others, but finally becoming his own publisher he engraved over one hundred portraits by Sir Godfrey Kneller and after many other artists of the time; he also engraved after Titiens, Correggio, and other painters. On the Continent his prints were highly prized. Smith's prints, which range from the latter part of the seventeenth century to the beginning of the eighteenth, include William and Mary, Anne, George II and the Princesses, the Stuarts, the noted men and women of the time, Congreve, Dick Steele, Pope, Newton, Kneller, Wissing, Isaac Beckett, Grinling Gibbons, Sir Christopher Wren, Mrs. Cross the actress-singer, Mrs. Arabella Hunt (famed for her singing, personal beauty and charm), the two actors Anthony Leigh and William Penkethman, and other portraits too many to mention, but all showing the touch of the master.

John Simon, the French line engraver, came to London about 1665. Here he engraved in mezzotint a number of pictorial subjects by Watteau, Rosalka, and others; also portraits after Kneller.

George White, line-engraver and portrait-painter, took to mezzotinting late in life, and introduced the method of etching and engraving the plate to give brilliancy before rocking the ground. This method was later carried out with excellent results. White's engravings are of people of the period.

Faber, born in Holland in 1695, the son of a mezzotint engraver. A pupil of John Vanderbank the portrait-painter, he engraved some hundreds of plates after the artists of the period from Anne to George II, 1712–1756, from Kneller to Reynolds, including Hogarth, also pictures by Franz Hals and others.

Peter Pelham, finding little work to do in London, went to Boston and published the first mezzotint in America.

Peter Van Bluck, Dutch engraver and portrait-painter, worked in England from 1723 to 1764; also Alexander Van Haechen about the same period. Both engraved a number of portraits.

John Brooks, an Irish mezzotint engraver, founded a school in Dublin in 1740. Among his pupils were Houston, Spooner, Michael Ford, Richard Purcell, and James McArdell. Houston and McArdell came to London in 1747. McArdell became the great master of mezzotint. He produced plates after Hogarth and all the noted painters of the day, but, being a great artist, he was not satisfied with them and turned to Vandyck. Here both painter and engraver shine forth in the engraving of the Duke of Buckingham's sons, and proclaim him the best mezzotinter of his day. Reynolds became eager for McArdell's interpretation of his paintings, and in 1754 McArdell began engraving the thirty-eight of his portraits before he died. These belong to the middle period of the painter's works. The charm and dignity of the fine ladies and gentlemen he engraved are due to the great artistic excellency of his mezzotinting.

Advance in art was going on apace. Exhibitions were being held, the Society of Artists was formed, and from its dissensions arose the Royal Academy.

Richard Houston's engravings are remarkable for their artistic rendering, the delicate lights and shades in his mezzotints showing a fine promise of great things, and great are his engravings after Rembrandt;

his portraits are after the painters of the period. Spooner did some mezzotints, but he was uncertain, as was Richard Purcell, who, through his love of pleasure, got into debt, and, having obtained advances from most of the publishers for work to be done, was at last put into the Fleet Prison as a debtor by Sayer, who kept him there copying other engravers' plates until he died, at about thirty years of age. Edward Fisher's finish, even to the subordinate parts, is said to have caused Reynolds to complain, but Fisher's prints are eagerly sought for by the connoisseurs for their finish. Among the many portraits he engraved is one of Paul Sandby, by Cotes. Sandby introduced aquatint into England.

James Watson, one of McArdell's pupils, engraved over fifty of Reynolds's pictures. He was one of the most conscientious engravers, and would discard a plate if it did not satisfy his artistic sense, and start it all over again. He exhibited at the Society of Artists at the age of twenty-two, and became a member. All his engravings show the artist and the skilful engraver's touch. His engravings are greatly prized by connoisseurs.

Elizabeth Judkins, Watson's sister-in-law, was the first woman who practised mezzotinting.

John Dixon, another of the Irish school, engraved a number of mezzotints after Reynolds (some of the best of that artist's work), among them the famous Elizabeth Countess of Pembroke and her son.

Thomas Frye (1710–1762), portrait-painter and mezzotint engraver, engraved a number of fancy heads.

William Pether, born in Carlisle, was a pupil of Frye, some of whose portraits he engraved, also after Le Brun, Rembrandt, Wright of Derby, and others.

John Finlayson (1730–1776): his engravings consist of portraits, principally among the theatrical profession.

Valentine Green (1737), the Prince of Mezzotint, as he is called, was a pupil of Hancock, the potter and engraver at Worcester. Here he learnt line engraving and also practised mezzotint, and, when he came to London in 1765, was a master of the art. He was elected a fellow of the Society of Artists and engraved many plates after the painters of the period: Romney, Cotes, Benjamin West, Falconet, Wright of Derby, Gainsborough, Sir Joshua Reynolds, and other artists. So great was the demand for his engravings that he became his own publisher in Salisbury Street, Strand. In 1773 he was appointed mezzotint engraver to His Majesty, and was elected an associate engraver of the Royal Academy. The sale of Green's prints of Benjamin West's classical and scriptural subjects brought him in a fortune, but his masterpieces are the gallery of "Beauties of the Present Age," so called in the prospectus, and priced at fifteen shillings each, or twelve shillings to subscribers. The engravings now fetch in the sale-rooms hundreds of pounds, and £1,000 was given at Christie's for a proof of the Duchess of Rutland. Green also engraved after Rubens, Raphael, Caraccis, Giordano, Vandyck, Van der Werff, and others.

Robert Dunkarton, born in London in 1744, painter and mezzotint engraver. "Jessamy Bride," after Sir Joshua Reynolds, P.R.A., was one of his finest plates.

Giuseppe Filippo Liberati Marchi, born about 1735, engraved for Sir Joshua Reynolds. His "Oliver Goldsmith" is the best known, and in proof state is much sought after.

Richard Earlom (1743–1822). His mezzotint engravings show a considerable use of etching and line engraving before laying the ground for the mezzotint. His engravings are after Van Huysum, Hogarth's "Marriage à la Mode," Snyder's market pictures, Brandoin, Zoffany, Hobbema's landscapes, Wright's "Blacksmith's Forge," Rubens, Vandyck, Velasquez, and other Italian and Dutch masters.

John Jones (1745–1797), an engraver of great delicacy and brilliant effects, both in mezzotint and stipple, engraved after Romney, Gainsborough, Reynolds, and others; he also engraved a number of theatrical portraits.

William Dickinson (1746–1823). His exquisite engraving, both in mezzotint and stipple, possesses the dignity and charm of a great artist, only equalled by the work of his friend Thomas Watson. Dickinson, in 1794, left London and settled in Paris, where he died. One of his most charming mezzotints is the portrait of "Elizabeth Stephenson," after the Rev. M. W. Peters, R.A. He also engraved after Reynolds and other artists.

Thomas Watson (1750–1781), son of a print-seller in the Strand, was greatly influenced by McArdell. His work is charming for beautiful depth of tones, richness of effects, and delicacy of touch, with great understanding of beauty in form. In 1770 he was associated with Reynolds, whose portrait of "Lady Bampfylde," engraved by Watson, possesses the combination of all the accomplishments of both artist and engraver, and has the honour of fetching the highest price paid for any one print, namely, £1,200. His "Mrs. Crewe" is a triumph of what can be done in mezzotinting. He also engraved after Daniel Gardner, Prud'homme, six of Lely's "Windsor Beauties," all of which are works of the highest quality, "The Countess of Ossory" being a masterpiece.

John Dean (1750–1797), a pupil of Valentine Green. His engravings are after Romney, Reynolds, Hoppner, Gainsborough, George Morland, and Opie.

John Raphae Smith (1752–1812), son of Thomas Smith of Derby, a landscape painter. He was apprenticed to a linen draper, came to London at the age of fifteen, and seems to have picked up engraving by his own industry, for there is no record of his being a pupil of any engraver. He worked hard: "pot-boilers" and masterpieces were engraved, also portraits and picture subjects, all of his period. Smith never went to the old masters for inspiration for his beautiful engraving. He engraved after Reynolds, Gainsborough, Romney, Morland, Bunbury, Peters, Benjamin West, Cosway, Opie, and other well-known artists. Smith also engraved in the stipple manner, and is said to have made much profit out of it. He published and printed a number of engravings after Morland in colour, and some were coloured by hand. Smith's prints were sold all over the Continent and America, and have fetched large sums of money, some of them running into four figures, but alas! they are not all masterpieces.

William Ward and his brother James, were pupils of Smith. William, who was born in 1766 and died in 1826, became one of the best engravers. He married George Morland's sister, and Morland married his. Many of the prints after Morland that are most prized by collectors were engraved by William, who also engraved, after Hoppner, the "Daughters of Sir Thomas Frankland," which is his masterpiece. His works are after the most celebrated painters of his period.

James Ward (1769–1859), was appointed painter and engraver to the Prince of Wales. The Royal Academicians opposed his election as a painter. He could have been elected an associate engraver, as his brother William was, but this he refused. His best work in mezzotint is after Hoppner and Reynolds, and Hoppner's "Juvenile Retirement" is usually considered his masterpiece. His work shows more artistic feeling than his brother's.

John Young, born 1755, a pupil of John Raphael Smith, engraved a number of plates in mezzotint after Hoppner, Zoffany, and others. He was also mezzotint engraver to H.R.H. the Prince of Wales.

John Murphy, born in Ireland, engraved in mezzotint and stipple after West, Northcote, and other painters.

Gainsborough Dupont (1767–1797), a pupil of his uncle Gainsborough the painter, he brought the touch of the painter to his mezzotints and the portraits after his uncle are excellent in quality and interpretation.

Among the mezzotint engravers of this period should be mentioned Charles Howard Hodges, painter and engraver, one of Smith's pupils; Jonathan Spilsbury, painter and engraver; Johann Gottfried Haid; Johann Jacobe; and Robert Laurie, whose principal works were theatrical, and who printed his mezzotints in colour. Later mezzotint engravers include Samuel William Reynolds, William Saye, Charles Turner, George Clint, George Dawe, Thomas Goff Lipton, David Lucas, and Samuel Cousins.

LINE ENGRAVERS

George Vertue (1684–1756), a pupil of Michael Vandergutch. His line engraving covers a great number of plates of portraits, all carefully done, if not of the highest order of art. He was appointed engraver to the Society of Antiquaries, and was buried in Westminster Abbey.

William Hogarth, born in London in 1697, died in 1764, painter and line engraver, was apprenticed to Ellis Gamble in 1712, and first became known by his plates illustrating "Hudibras," published in 1726, "The Harlot's Progress," 1733, and "The Rake's Progress," and a number of other pictures and portraits. Through Hogarth's energy an Act was passed securing to the artist the copyright of his own designs. Hogarth did not engrave all the plates attributed to him. Some were engraved by Bernard Baron, the French engraver; Simon François Ravenet, who engraved two of the plates for "Marriage à la Mode," and Luke Sullivan, who engraved his "March to Finchley."

Ravenet, who came to England in 1750, was a pupil of Le Bas, who blended line engraving and etching, which had a considerable influence on the advancement of the art. Ravenet's engravings after Titian, Rembrandt, and other old masters, also after Zoffany, Reynolds, and other contemporary painters, show richness of colour and brilliancy of effect.

John Hall (1739–1797), one of Ravenet's pupils, engraved after Reynolds, Gainsborough, West, and others. He became historical engraver to the King. His most important works were "Oliver Cromwell Dissolving the Long Parliament" and the "Death of Schomberg at the Battle of the Boyne," after West.

Pierre Charles Canot, line engraver of landscapes and seascapes, Associate of the Royal Academy.

François Vivares, the first landscape engraver in England, and founder of a school of engravers in line.

Lupton Thomas Goff, a pupil of Clint, born in Clerkenwell, 1791, died in 1873, mezzotint engraver, established the use of steel in place of copper, for which he received the Gold Isis Medal from the Society of Arts.

Robert Strange, born in Kirkwell, in the Orkneys, in 1721, died in 1792, was apprenticed to Richard Cooper, an English engraver in Edinburgh. At the rising of "Bonnie Prince Charlie" he became a Jacobite, and engraved the Prince's portrait and money notes for the Prince's army. He joined the Life Guards, and bravely fought in the Battle of Culloden (1746). Escaping from the battlefield, he sought refuge in Edinburgh, where he married Miss Lumisden. He then went to Rouen and studied drawing under Deschamps. In 1749 he went to Paris to study engraving under Le Bas. Strange soon learnt all Le Bas could teach him and more, and came to London in 1750. His great endeavour was to cultivate taste in art (which he considered had fallen very low at this time) by engraving after the old masters, chiefly Italian. In 1757 he published the famous plates " Caesar Repudiating Pompeia," " Romulus and Remus" after Cortona, and " Charles I's Three Children " after Vandyck. Strange, who was now known all over the Continent as a famous engraver, made, in 1760, a tour of Italy, which was a triumph. Everywhere he went he was received as the great artist, his genius being acknowledged by the conferring of the memberships of the Academies of Florence, Rome, Bologna, and Naples. In Parma he was appointed Professor of the Royal Academy, and while in Italy he engraved many pictures. In 1765 he was elected a member of the Royal Academy of Painting and Sculpture in Paris, and in London a Director of the Incorporated Society of Artists. At this period he seems to have quarrelled with most of the artists and engravers, and so removed with his family to Paris, where he engraved a number of plates. In 1780 he again returned to London, and engraved the masterpiece of " Charles I " after Vandyck, also the plate of " Queen Henrietta " from the King's collection, and the " Princes Octavius and Alfred " after West, for which he was knighted.

William Woollett (1735–1785), apprenticed to John Tinney, engraved in line and etching. His principal plates were landscapes of a very high order, after Claude Lorrain and Richard Wilson. The most famous of all his engravings are the " Death of General Wolfe " and " The Battle at La Hogue " after West.

William Sharp, born 1749, was apprenticed to Longmate, an heraldic engraver, and became one of the best line engravers of the century. He engraved " Alfred Dividing the Loaf with the Pilgrim " after West, " The Doctors of the Church " after Guido Reni (which he considered his masterpiece), many fine portraits and historical subjects of the highest class, " Dr. Hunter " after Reynolds, also after Romney, Raeburn, Vandyck, and other painters. Sharp was the last of the great copperplate line engravers.

John Keyes Sherwin (1751–1790), a pupil of John Astley and Bartolozzi, was a painter and engraver in line.

James Basire, line engraver, held the position of engraver to the Royal Society and to the Society of Antiquaries; the latter post was also held by his son and grandson.

James Heath, line engraver, Associate of the Royal Academy, and pupil of Joseph Collyer, the stipple engraver, was appointed engraver to the King in 1794.

At the end of the eighteenth century line engraving was in its decline, and although a considerable number of engravers of merit are necessarily left out of this short history owing to want of space, there are a few who should be mentioned, as William Byrne, William Angus, B. T. Pouncy, Daniel Lerpinière, William Blake, James Gillray, Thomas Rowlandson, John Landseer, the father of Sir Edwin, Thomas and Charles Landseer.

STIPPLE ENGRAVERS

William Wynne Ryland (1732–1783), apprenticed to Ravenet, finished his art education in Paris under Le Bas, Boucher, and Jean Charles François, who taught him the method of engraving chalk drawings, which

Ryland introduced into England under the name of stipple. He was a master of the classic drawing of the figure and a first-class line engraver. He published prints in partnership with Henry Bryer, one of his pupils. Ryland's stipple engravings after Angelica Kauffmann were a great success, the daintiness of the coloured prints being greatly admired. Some of the more famous are "The Judgment of Paris," "Beauty Crowned with Love," and "Cupid Bound to a Tree." Ryland, with Signeur from Paris (an expert in colour-printing) and Bartolozzi, evolved the colour print. Their process was from a single printing, Le Blon's being from three plates. The colour prints were a great success, and money flowed in. Ryland became recklessly extravagant, and in 1783 he was a ruined man, not only financially, for he was also fleeing from the law, having committed forgery. He attempted suicide by cutting his throat, was convicted, and was hanged at Tyburn.

Francesco Bartolozzi, born in Florence in 1727, died in Lisbon in 1813, line and stipple engraver, came to London in 1764. In line engraving his plates of "Clytie" after Caracci and others stamp him as a master. It is, however, in stipple that Bartolozzi is best known, and his engravings after Reynolds, Gainsborough, and Romney are of a high order. The most popular prints of his time were his own designs of fanciful and mythological subjects, and his stipples after Cipriani and Angelica Kauffmann are the most fashionable to-day. Bartolozzi's plates number thousands of every class of subject and of differing quality. He had many pupils, and signed their work as well as his own; thus some of his plates are high class, others good, bad or indifferent.

Caroline Watson, daughter of the famous engraver, engraved in stipple (some of the best plates ever produced) after Reynolds, Romney, Hoppner, Sam Shelley, and Cosway. She was engraver to Queen Charlotte and a great favourite.

Peltro William Tomkins, a pupil of Bartolozzi, and engraver to Queen Charlotte. His stipple engravings have an originality and charm, his portraits are good, and the colour prints of "Morning" and "Evening" after Hamilton fetch high prices. He was also a clever original designer.

Charles Knight, pupil of Bartolozzi, whose best work he applied to his plates, engraved a number of charming plates after Stothard, J. R. Smith, Singleton, and others.

William Nutter engraved some charming portraits and subject pictures after Bigg, J. R. Smith, Russell, Morland, Hamilton, Singleton, Stothard, and others. His prints are much sought after by collectors.

Robert S. Marcuard, J. M. Delatre, John Vendramini, Peter Simon, and others all did charming stipple engravings after Angelica Kauffmann, Stothard, Cipriani, Reynolds, and others.

Thomas Burke studied mezzotint under Dixon, but he made a reputation as a stipple engraver. His work was more finished and closer, possessing a velvety quality. Burke was Angelica Kauffmann's favourite engraver.

William Bond, William Blake, Joseph Collyer, Charles Wilkin, J. Conde with his lightness of touch, William Dickinson the mezzotint engraver, Thomas Gangain, and William Ward are others whose names should be mentioned.

Wood Engravers

Thomas Bewick, born in Cherryburn, near Newcastle, in 1753, pupil of Beilby, general engraver, is believed to be the first wood engraver to use the upright way of the grain to engrave upon. The early wood engravings were cut with a knife on the long way of the grain, as in a plank of wood, usually of apple wood. Bewick used box wood and engraved upon the end of the grain, using tools in the same way as a copperplate engraver. This is the method followed by the wood engravers since his time. He engraved white lines to produce the effect, and is usually called the Father of wood engraving in England. His most celebrated work is the *History of British Birds.*

Luke Clennell, 1781, pupil of Bewick, won the Gold Pallet of the Society of Arts, also the Gold Medal in 1809. He afterwards became an artist and exhibited at the Royal Academy.

William Harvey, an apprentice of Bewick's, engraved some of the cuts in his master's *Fables of Aesop.* He gave up engraving for drawing, and illustrated many books. His best work is considered to be Lane's *Thousand and One Nights.*

John Anderson, John Jackson, and Ebenezer Landells were also pupils of Bewick. Jackson engraved many of the illustrations in the *Treatise of Wood Engraving,* by Mr. Chatto. Landells came to London in 1829, set up a studio and engraved for the *Illustrated London News, Punch,* and other papers.

Robert Branston, a self-taught wood engraver, born in Lynn, Norfolk, in 1778, engraved the "Cave of Despair" and some of the illustrations in Scholey's *History of England* and Bloomfield's *Wild Flowers.* His son was also an engraver.

John Thompson, born in 1785, and a pupil of Branston, was the best of all the engravers of the period. His finest works are the illustrations to *The Vicar of Wakefield* after the drawings by Mulready. He also engraved for the Bank of England the vignette of Britannia, which is still used on the bank notes, also the design by Mulready for the postal envelope. His collection of woodcuts is in the Art Library at South Kensington. Thurston Thompson, son of John, was also an excellent engraver.

William Harvey, born in Newcastle-on-Tyne, engraver and designer, illustrated Lane's *Arabian Nights*, and engraved a large block, 15 by 11¼ in., "The Death of Dentatus," by B. R. Haydon, whose pupil he was for drawing.

Charles Thompson first introduced in Paris the practice of engraving on the upright way of the grain (on wood).

William James Linton Jackson, born in London in 1812, died in New Haven, Conn., U.S., 1898, went to the United States in 1867, was a Radical politician and author, and illustrated a number of books, among them a *History of Wood Engraving in America*, 1882.

Timothy Cole, born in London in 1852, bcame noted in America as a wood engraver. His most important engravings are from the old Italian masters.

W. T. Green, Whimper, Gray, Evans, Quartley, W. Dickes, Vasey, Gardner, Roberts, Thomas, Palmer, and Pannemacher are also worthy of mention.

Electrotyping was first introduced in 1840.

James Abbot McNeill Whistler, born in Lowell, Mass., in 1834, died in London in 1903, was one of the distinguished American painters and etchers. He studied art in Paris under Gleyre, and in 1863 came to London and was elected President of the Society of British Artists. He wrote *The Gentle Art of Making Enemies*.

W. L. Thomas, who founded the *Graphic* newspaper, was an excellent wood engraver.

There are many more engravers who should be mentioned, but this is only a sketch history, and, as space is limited, the engravers of to-day will not be touched upon, although many of them are the best of all.

CHAPTER II

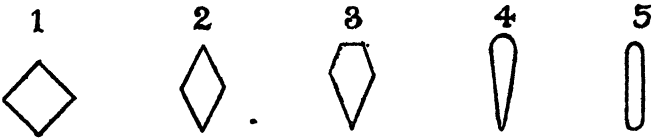
LINE ENGRAVING (INTAGLIO)

LINE engraving is the most difficult of all methods of engraving. It requires years of patient practice to engrave a series of lines to represent a single tint of one tone, and it is necessary to engrave every tone on the plate, not only to represent tone, but to engrave the lines in the most suitable direction to suit the subject engraved. The depth of the line engraved also alters the tone, as also does the width of the line. For example, a fine, shallow cut will print a fine, light-grey tone; the same line cut deeper will print blacker; a broad line cut shallow will print grey; the same width of line cut deep will print black, and so on. The depth of the line alters the tone when printed, the tone is also altered by the distance the lines are apart. Thus, if the lines are cut to print black and lines and spaces are equal, the tone will be a middle tone ; the same width of lines and the spaces less in width the tone will be darker. By spaces is meant the bare surface of the metal between the lines engraved. Lines can be re-entered again and again to produce the desired tone, or after the line is engraved the plate can be rolled up and the line can be deepened by etching, as described in the chapter on Etching. The lines can be crossed and recrossed to produce darker tones and to reduce the coarseness of lines. The spaces between the lines may be filled in with finer lines, dots or flicks.

Tools when purchased are, as a rule, too long to work with comfortably, and it is advisable to knock a piece off the end to the desired length and to have the face re-ground. The tools that are used are of various patterns. The most useful of all is, perhaps, the "graver" all the others are to some extent modifications of this tool. The following are the principal tools used by line engravers—

(1) The *Square Graver.*—This tool cuts a line V-shaped with the walls of the line at right-angles to one another.

(2) The *Lozenge Graver* cuts a line V-shaped, but the walls of the line are at a more acute angle than the square graver; but, if pressure is used to make the cut the same width as the square graver, the resulting line will print darker than the line cut by the square graver, because it is deeper.



(3) The *Tint Graver.*—This tool is the same shape as the lozenge graver, having the belly or cutting edge ground slightly round so as to cut a line wider than the lozenge graver without going so deep. These tools are usually made up in sets, numbered from 1 to 12, each number cutting a line a fraction wider than the preceding one. They are all made from the same-sized tools.

(4) The *Tint Tool.*—This tool has its sides at a more acute angle than the lozenge graver, and the tools are made up in sets from 1 to 12 or more, like the tint gravers.

(5) The *Scorper* has its sides nearly parallel to each other, and is used for cutting in deep blacks. Scorpers are made in different widths.

(6) The *Spit Sticker* differs from the previous tools in shape and also the kind of line it cuts. It is made up in sets as the tint gravers. It resembles the tint

tools in size, but, instead of the sides of the tool being flat, they are slightly bowed out, and the belly of the tool is curved upwards. The cut of this tool holds more ink than the tint graver, but less than the tint tool, with the same width of line.

(7) The *Bull Sticker* is like the spit sticker, only that the sides, although bowed, are at a wider angle, thus cutting a much wider line for the same depth of cut. It is also made up in sets.

(8) The *Many-liner* or *Devil Tool* has a flat bottom on which lines parallel with the length of the tool have been engraved. It will cut two to seven or more lines at the one cut, and is used principally for cheap commercial work.

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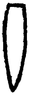

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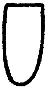

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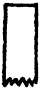

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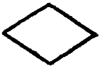
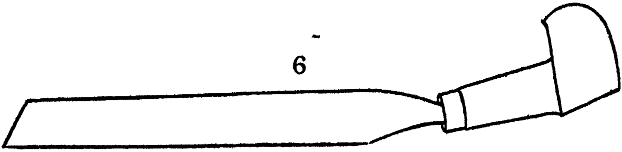




Correct way of Mounting Tool in Handle.

(9) Obtuse tool for cutting square cuts.

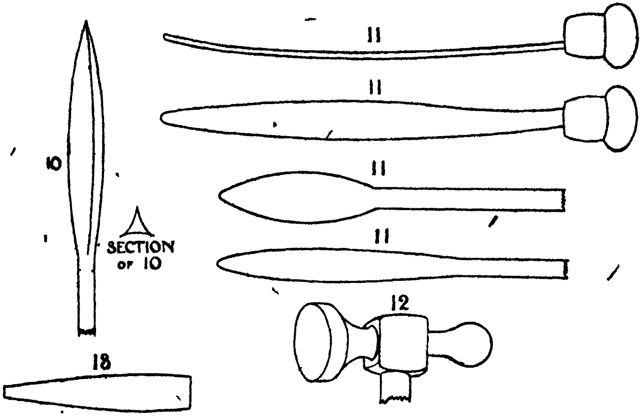
(10) *Scrapers* are used for removing the burr made by the engraving tools; they are usually triangular in shape and sharpened to the point with three cutting edges. There are also flat scrapers, or one side of the face of any tool can be used for the purpose, or the belly of the No. 1 spit sticker.

(11) *Burnishers* are made in various shapes and sizes.

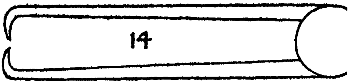
The smaller sizes are the most convenient to use, and the shape that one prefers is the best to handle.

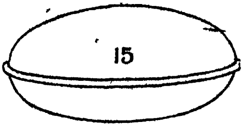
(12) *Small Hammer* with flat and round head.

(13) *Puncher* is a piece of steel about 3 in. long, tapered and finished at one end. It is used for removing a portion of the work that has to be altered. Three or four different sizes will be required.



(14) A pair of *callipers* for marking the part to be removed upon the back of the plate.





(15) A *Sand Bag*, for the support of the copper plate while it is being engraved upon. This is made by sewing two circular pieces of leather, kid, or calfskin, 6 to 12 in. in diameter, together at the edges, leaving an inch so as to fill the bag with dry silver sand. Do

not stuff it too full, as it will not be so comfortable to work upon. The sand bags that are sold in supply shops are often too hard and too small. The sand bag should be raised to a convenient height from the table by blocks of wood or a small box. The light diffuser, as described in Chapter XI below, should be so arranged so as to prevent glitter from the lines engraved.

For the purpose of working, the best tool to start with is the graver, and it will be well to practise with it several hours each day until a complete command of the tool is acquired. The graver is grasped firmly in the right hand by placing the little finger in the hollow part of the handle (if the edge of the hollow in the handle is sharp, round it, so as to make the little finger hold it comfortably). The round part of the handle is pressed into the lower part of the hand by the little finger, and thus the little finger is holding the tool in the lower part of the hollow of the hand, without assistance from the other fingers or the thumb. Now, while holding the tool by the little finger, place the tool upon a copper plate, allowing the flat part of the handle and the belly of the tool to rest upon the surface; raise the handle slightly, allowing the point to rest upon the surface. The finger and thumb should now be allowed to cling round the tool so that it will cut into the copper without leaning over sideways. The thumb should rest firmly upon the plate. Then, without moving the thumb, the tool is pushed by the hand backwards and forwards; thus the thumb steadies the hand upon the plate, and the first finger presses the tool against the thumb and also presses the tool into the plate. The little finger holds the tool in the hollow of the hand, and the movement of the hand is to push the tool along the ball of the thumb, which does not move at the time of making the cut. The other two fingers do practically nothing but help to hold the tool in the most convenient way. The wrist also plays an important part in engraving, but, as one is unconscious of its movement while engraving, it must be concluded that its movement is governed by a subconscious action of the brain. The left hand holds the plate upon the leather pad in such a way that the plate is entirely under the control of that hand; thus the left hand controls the copper plate, and the right hand controls the tool. Both hands must be trained to work in unison, for, though it is possible to engrave a wavy line with the right hand alone, it is not possible to engrave a curve of any size without the help of the left hand. This hand turns the plate in the desired direction at the same time that the right hand is engraving the line.

The angle at which the tool is held in relation to the copper plate is such that, while making the cut, the tool does not slip out of the line being engraved upon the copper, and at the same time it must not dig in. Thus the angle must be one at which the line engraved is entirely under the control of the hand, a matter requiring considerable practice.

Spreading the line is done by pressure of the forefinger, hand, and wrist, the tool being kept at the same angle and not dug in, unless in exceptional circumstances, as when there is a sharp dark in the engraving, in which case the tool is dug into the copper to the required depth. In the case where the line, being of some depth, is brought to the surface so as to make a dark tone soften into a white, the pressure is gradually taken off the tool and the angle slightly altered. It is advisable for the student to take a graver, tint tool, or spit sticker (the last is the easiest to use but not so useful as the graver), and practise engraving tints of different tones on a piece of copper so as to obtain a control over the tool. (A tint is a series of lines close together or far apart, giving, when printed, an even tone, except in the case of a graduated tint; that is to say, a tint in which the tone starts light and finishes grey or dark or *vice versa.*) The student, having obtained a control over the manipulation of the tool, can now proceed to attempt the engraving of some easy subject, with not too much work in it. The design can be traced or drawn upon the copper with a soft lead pencil or carbon paper. There are several ways of placing the design upon the copper plate described in the chapter upon Etching (page 53).

A satisfactory design having been traced upon the copper (which should be reversed), the outline should now be engraved with a fine graver or spit sticker, care being taken not to engrave too deeply, nor to engrave upon any white portion of the design. The outline can be slightly drawn in with an etching needle, with the same care as before. If the outline thus engraved is not intended to print, it should not be deep, as it is only a guide for the engraving upon the plate.

In starting the engraving proper, it matters very little whether you start with the darker portion of the plate or with the lighter. This assumes that the engraving is in single lines (single line engraving is an engraving in which the tones are produced by a series of lines that are not crossed by other lines, a method which has not been practised to any great extent, although it has a charm all its own). When the plate is engraved all over with single lines which form the subject or design, the burr which has arisen on each side of the lines should be scraped off with a scraper or the side of the face of the tool, and the plate should be polished with a piece of 000 emery paper or fine flour emery, to make the surface quite smooth without damaging the engraved lines. A proof should be taken, but it will probably look rather flat, that is, wanting in contrast. Should the finer lines be too dark, they should be scraped down with the scraper or burnished with the burnisher. Should the dark be too light, the lines must be re-entered with the graver, and either one side only or both sides of the lines must be engraved. Also the lines can be deepened to hold more ink if it is not desirable to widen the line, which is done by using a thinner tool and cutting only at the bottom of the line.

It should be noted here that the lines can be re-entered as many times as desired, not only to alter the tone, but also to regulate the line so as to make the tones smooth and not look scratchy. The line may also have to be returned, by which is meant re-entering it from the opposite direction. The reason for this is that, when starting to engrave a line, the tool does not cut at the beginning of the line the same depth or width, and the line has to be re-entered from the opposite direction if it is desired to make the line uniform in tone, or to bring it up to a sharp edge, because the belly of the tool would press the metal down and cause a tone to print where it is not wanted. Therefore, on starting a line or tint from a sharp white, the line should be begun a little way from the sharp white and returned up to it. This will keep the white free from any kind of burring down which would print. If by any accident the white has been burred down, the plate will have to be punched up from the back, scraped down, and repolished, and that portion engraved over again (see chapter on Etching).

To produce greater depth of tone, lines can be crossed by other lines after the main lines have been engraved. (The main lines are those that are most pronounced, and that give the formation of the modelling of flesh, drapery, trees, clouds, accessories, etc.) The main lines can also have a thinner line engraved between them, to produce a similar effect, but at the same time not to darken the tone so much, or flicks, which are short lines engraved between the main lines, or a combination of dots and flicks. A third or fourth line can also be engraved, crossing at a different angle.

After gaining considerable experience in the art of engraving it will be found more convenient to do all the crossing of lines first. This method can be used only when you know exactly what you wish to do, and also have a complete knowledge of how to do it, which is gained only by experience and careful thinking out the best combination of lines. The student will probably ask what is the advantage of this method. The advantage is that it is much easier to engrave a strong line (which is the main line) upon finer lines than it is to cross a strong line with finer lines. Another point gained is the appearance of the proof when the main lines are the last engraved; the proof appears to have better modelling and to be more refined, the cross lines adding tone without appearing pronounced. Also by this method the plate does not take so long to engrave.

Textures are produced by short lines, flicks or dots, crossing and recrossing at different angles. These can be varied to any extent, so as to produce flat diaper patterns or to facilitate the modelling of any kind of texture. The student should endeavour to engrave the lines to represent the object that is being engraved. Thus, skies are usually engraved with horizontal lines, water with horizontal or vertical lines. These lines may be straight or with a movement in them. The movement or wave in the line gives vibration to the engraving. A line engraved in the direction of movement gives direction to the movement. Thus, the direction of the lines in a stormy sky should be engraved in the direction of the movement of the clouds, or a ripple upon water should be engraved with the lines following the movement of the ripple. In representing folds of drapery the lines should follow these, and, although mechanical precision is necessary when engraving, the engraving should not appear mechanical, but should be free with a flowing line that has not the least appearance of effort. The appearance of effort, *i.e.*, the over-elaboration of line or lines for effect, will ruin the artistic value of a plate. A free and flowing line possesses a charm that over-elaboration will completely destroy. The student should obtain various prints of the best examples of engraving and carefully study them, but he should remember at the same time that the best of them are capable of improvement, and that, although art engraving has comparatively died out owing to cheaper photo-mechanical methods, there is yet a considerable field for a master of the art of copper-plate engraving. Collectors still buy good prints at high prices, and they would welcome the great master of engraving, who is yet to come.

CHAPTER III

THE PREPARATION OF WOOD FOR WOOD ENGRAVING

THE earlier engravings upon wood were more in the nature of carving than engraving, and were upon the long way of the grain. Wood is used either the long way of the grain or upon the grain upright. The long or horizontal way of the grain is just an ordinary plank of wood planed quite true to type height, then finished off on the surface with fine glass paper until quite free from scratches, the wood being usually pear tree. This method was used by all the earlier engravers, and the engraving was done with tools quite different from those used upon the upright grain. For poster work the planks of wood were glued together or tongued and glued together to the size required, and, to prevent them from warping, a cross-piece was tongued and glued on either end as on a drawing board, or the board was sawn one-third of the way through from the back, in squares about 4 to 6 in. square to prevent warping. For the upright or vertical way of the grain, it was necessary to use a wood that was of very close grain, hard enough to engrave upon. Box-wood was found the most suitable, and as the box-tree does not grow very large in circumference it became necessary to join up small pieces. These were glued up, and larger pieces were made by tonguing them up to other pieces made in the same way (these are known in the trade as box-wood blocks). Amalgamated blocks consisted of small blocks, joined together by bolts and nuts, that could be taken apart and put together again. Thus, a block the size of a page of the *Illustrated London News* could be taken into eight to ten or twelve pieces, or a double page into double the number of pieces. This meant a great saving of time, as it allowed twelve or twenty-four engravers to work on the same engraving at the same time. Fig. 1 shows a section of the method of joining the amalgamated block. A, slot cut from the back of the block; B, nut; C, bolt; DD, box-wood

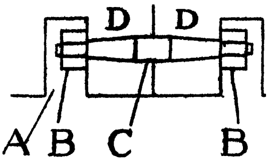


FIG. 1

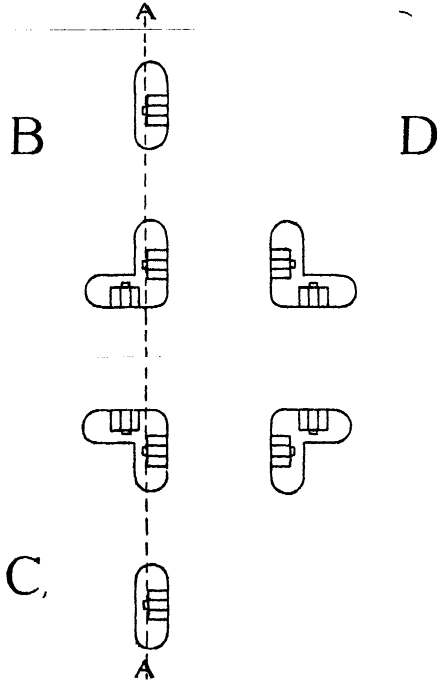


FIG. 2

block. Fig. 2 shows the back of a block that can be taken into four pieces, the method being as follows—

With a thin spanner (supplied by the box-wood manufacturer) unscrew the nuts down the dotted line at A as far as they will go,then pull the pieces BC from DE as far as the nut will allow, then unscrew the nuts until they fall off; the two halves will then pull apart, leaving the bolts in the DE half. BC and DE can now be taken apart in the same way. To join the block together again, join B to C, D to E, then BC to DE; push the bolts into the holes until they just appear in the slots, then drop a nut into a slot and screw on lightly, then the next on, and so on. If the nut is screwed on too far, it will be impossible to get the next one on, as the slots are made as small as possible. Now screw B to C and D to E as tightly as possible, and proceed in the same way with BC to DE. Before the introduction of amalgamated blocks, large blocks were sometimes sawn half-way through the back and then broken apart into pieces, to allow more engravers to work on the same block. When the engraving was finished, the pieces were glued together again. This took a long time, as the glue had to get hard, and it also had to be engraved out of the lines at the joints.

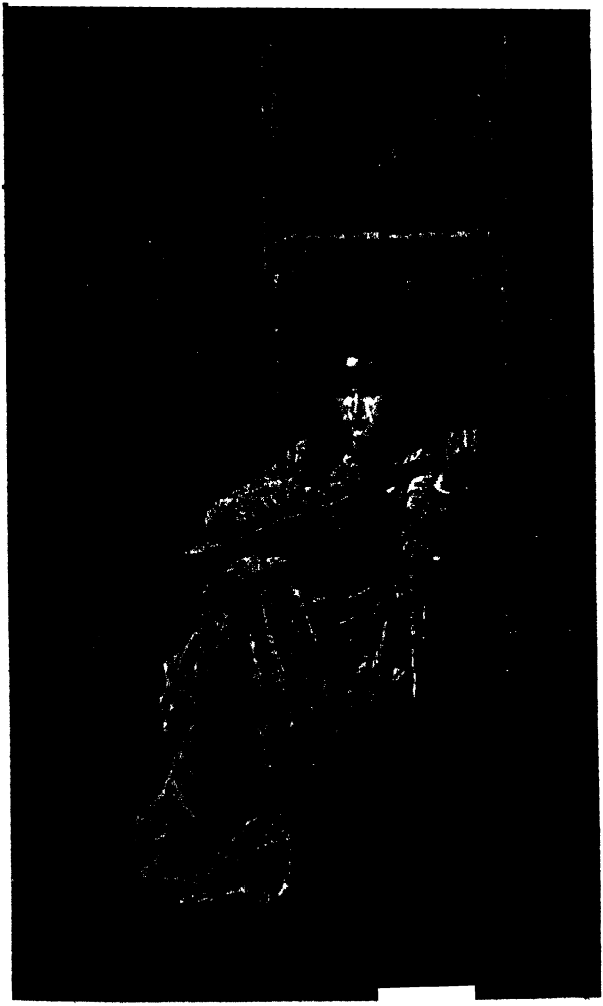
CHAPTER IV

WOOD ENGRAVING

THE art of wood engraving is far easier of accomplishment than engraving upon metal, by which is meant not copper-plate engraving or steel engraving, but engraving upon metal in the same way as wood engraving is done for surface printing. In copper and steel-plate engraving, the lines that are engraved are the lines that print. In wood engraving, the lines that are engraved are the lines that do not print. The difference is that copper and steel-plate engraving are printed, intaglio and wood engraving is surface printing.

Intaglio printing is done by filling up the lines engraved with ink, polishing the surface and taking an impression of the plate with enough pressure to squeeze the ink from the engraved lines on the paper. In surface printing the ink is rolled on to the surface of the engraving by a composition roller, that is, none of the ink is allowed to fill up the lines. An impression is then taken with a burnisher or pulled in a printing press upon paper.

Therefore it will at once be seen that the lines or spaces that are engraved upon wood are not the parts of the plate that print on the paper. The parts that print are only those that are left upon the surface and have not been touched in any way by the engraving tools. There are two kinds of wood engraving; the one is called facsimile and the other tint, wash or tone; sometimes the two are combined. Any good tint engraver could engrave facsimile, but not all facsimile engravers can engrave good tint work.



" FANNY BUNTER

From the Wood Engraving by T. W. Lascelles. *After E. J. Gregory, R.A.—P.R.I.*

It is advisable for the student to start with the facsimile engraving, because, owing to the accuracy necessary in engraving, it will be quite easy to see if the necessary command of the tool has been accomplished. When the student can engrave a series of thin black lines crossing at right angles, about a sixteenth of an inch apart, the line left upon the surface to print being thin and of uniform thickness, he has passed a very severe test, which, being passed, would show that the engraver had complete command over his tools. It is essential that complete command of the tools must be obtained if the student wishes to become a master of engraving, for without this command it would be impossible to engrave well a subject, portrait or landscape in tint. The articles and tools required to start with are a sand bag; some pieces of box-wood, which can be odd-shaped pieces sold as practice blocks, and are already prepared upon the surface; an HHHH lead pencil; a piece of beeswax; a tube of Chinese white; a piece of bath brick; thin brown or green paper; a graver; a square tool; a narrow and a broader flat tool; a thin scorper; and a burnisher of the French type, that has a slight curve and is flattish on the under side; also a few sheets of India or China paper and a quarter of a pound of the best letterpress proofing ink for wood cuts, and a composition proofing roller. It is advisable to have a north light to the workroom if possible, because it changes least of all and does not strain the eyes.

The engraver sits facing the window. The light striking across the work shows the depth of the engraving quite easily. The sand bag should be at a convenient height, so that when the box-wood block is placed upon it the engraver can work easily without leaning over his work too much, because there is no necessity to become round-shouldered.

On no account should the box-wood block be placed in sunlight, as it would certainly crack; should this happen, the best thing to do is to take it to the box-wood manufacturer and ask him to break it apart and glue it together again, then carefully engrave any glue away.

The sand bag and tools are all described in the chapter on Line Engraving (Intaglio), and also the method of holding the tools.

The tools, although the same, are used in a totally different way from that followed in Intaglio. Before beginning to engrave, it is necessary to produce the design or subject upon the box-wood block in black and white, by means of drawing, transfer or photography. The design must be reversed; the transfer reverses the design.

To prepare the wood for drawing upon, take a little Chinese white and a small quantity of finely-ground bath brick, with enough water to rub evenly all over the piece of boxwood. It should then be well rubbed in, and finally brushed off with the palm of the hand so as to have the thinnest possible film of white. This should also have a tooth to it from the bath brick, which must be enough to enable the block to be drawn upon by an HHHH pencil without scratching the wood surface. On no account must the surface be scratched with the pencil, or it will probably not ink up when the engraving is finished. If this should happen, the scratch can sometimes be taken out by slightly wetting locally, but it is better to avoid this by preparing the block with the proper tooth.

It should be noted that in preparing the surface of the block the same amount of water used for the surface should be lightly sponged upon the back of the block.

After the block is coated it should be stood upon an end to dry: this will prevent the block from warping. The design is drawn upon card or paper, or a photograph or another engraving can be used. It is then traced upon a piece of thin transparent tracing paper with a B or HB pencil. Having done this carefully and cleanly, rub round the sides of the boxwood block a piece of beeswax, turn the tracing over so that the pencil side is next the grained surface of the wood, place it in position, then press the tracing paper down the sides, making them stick to the beeswax, and taking care that the tracing paper with the design upon it is quite flat and in contact with the surface of the block. Now go all over the design upon the tracing paper with the HHHH pencil, and lift up one corner of the tracing to see if enough design has been traced upon the surface of the block for you to draw upon. If so, remove the tracing paper; otherwise you must go over it again with a little more pressure with the pencil. The tracing upon the wood should only be enough to work upon with a pencil. Having succeeded in tracing down the design, you now proceed to finish the drawing, which is done either in outline or facsimile engraving or in wash for tint work. If the design is finished in outline, that is to say, any drawing made with a pen, pencil, or point of a fine brush, in which the tones that are produced are tones that are made with black lines drawn singly in the form of a tint, or crossing each other at any angle, that is to say, the drawing is in line, just the same as it should appear in the proof after the block has been engraved. If the drawing is finished in wash for tint engraving, the drawing on the wood should be finished in just the same way that a wash drawing upon paper would be finished, and the tones drawn upon the wood. The finish of the drawing should be just as you would wish the engraving to be when finished, that is to say, the better the drawing, the better the engraving should be. It should be remembered that, in laying a wash or working with a paint brush upon the wood, one must never use more than the necessary quantity of water to make the drawing, because the wood swells and is apt to curve or crack. If much water is used, the back should also be wetted with a sponge. The block should then be stood upon end to dry, but do not dry it by heat, as it is likely to crack.

When it is desired to transfer a print upon wood, if the print is wet, that is, if it has just been taken from an engraving, either from another wood block, a copper plate, a stone or a zinc plate, it can be transferred to the prepared wood surface by placing the wet print in position on the wood and then pulling it in a proofing press. The pressure should be somewhat greater than that used for proofing. After putting the pressure on, allow it to remain for about a minute to enable the ink to soak into the wood, release pressure and lift up one corner of the print to see if the print has transferred. If it has not, pull again with more pressure until the desired result is obtained.

A slow-drying ink should be used for the wet transfer, and not too thin or too much, as it will smudge. The paper used should be a hard paper or any of the litho transfer papers, which should be damped when stripped off.

To transfer an old print upon the wood, take one stick of potassium hydrate, 4 in. long, and dissolve in alcohol, 8 oz. This should be handled with care, as it will burn the fingers and nails. Place the print in a developing dish, pour the solution all over the print at once, and allow it to soak for one or two minutes—

the time depends upon the age of the print. The print is then (without washing) placed upon the boxwood block, and pulled in the press as before described.

For reproducing the design upon the wood by photography there are several possible methods of procedure, but they are highly technical and do not come within the scope of this book. There is, however, one way which is fairly simple, can be used by anyone not acquainted with photography, and is inexpensive to practise.

The articles required are a reversed negative; a dozen pieces of ivory black carbon tissue sensitized, which can be of any size from ¼-plate upwards; some pieces of temporary support, which should be larger than the pieces of carbon tissue; a photographic printing frame, an actinometer, and a flat squeegee. The boxwood block should be prepared with a thin coat of Chinese white. If it should be found that the carbon tissue will not stick to the Chinese white, a little fish glue must be added to the Chinese white when preparing the block. The negative should be placed in the printing frame, glass side down, and a piece of carbon tissue is placed black side down in contact with the negative.

It is the black gelatine side that prints. The print cannot be judged by looking at it, hence the use of the actinometer. Afterwards the back of the printing frame must be placed in position and spring fastened. The frame should be placed in a north light to print, with the actinometer beside it. A thin negative is best, as a thin print is required, because, if the print is thick, it will peel off in the darks when engraving.

When the print is judged to be sufficient, the piece of carbon tissue and a piece of the temporary support are placed in a dish of clean water and allowed to soak for about one minute. The waxed side of the temporary support is brought in contact with the black side of the carbon tissue and lifted out of the water sticking together. Both are then squeegeed to expel any water or air bells between them, put under pressure enough to keep them flat between sheets of blotting paper, and allowed to stand for twenty minutes. They are then placed in hot water, 100° to 115° F., the carbon tissue face up. After a few minutes the pigment in the tissue will ooze out at the edges, and the tissue can then be stripped off the temporary support by lifting it at one corner and slowly pulling off backwards, whilst both pieces of paper are under the water. The piece of paper is then thrown away, being of no further use, as the print is on the temporary support, but is not seen yet. Place a sheet of glass under the paper and develop the print by throwing the hot water all over the black mass until the print appears quite clear and distinct. Then rinse in cold water, pin it up to drain all the water off, but do not let the printed gelatine dry, but squeegee it straight on the wood. Place a piece of damp paper on the back of the boxwood block, then place all under pressure, and allow to dry for an hour or two; when quite dry, the temporary support and the paper on the back can be stripped off, and the print will remain upon the wood.

Facsimile and tint engraving are also divided into two classes of engraving, mechanical and art engraving, both of which have been practised from the common commercial to the highest form of art, the difference consisting in price, time, and ability.

The student should at first practise engraving a series of lines in facsimile. These lines may cross one another at any angle. If they are intended to be mechanical, they should be ruled; if for art work they should be drawn freehand about one-sixteenth of an inch apart to start with. The student has now to engrave away all the white parts of the block, leaving the lines drawn standing in relief. In mechanical engraving it is usually begun by engraving a very thin white line or cut on either side of the lines that cross in one direction. This cut or engraved line is done with a knife tool, which is a No. 1 tint tool, ground very fine on the sides, so that the line that it cuts is so fine that it will not print as a white line. If the lines have been ruled, crossing at right angles, the lines that cross the lines just outlined with the fine tool should be engraved with a tint tool, about No. 4, the belly of which should be ground somewhat flat. The cut on either side of the line must start sufficiently far away from the upright line (the line previously outlined) so as not to burr the line down with the belly of the tool when making the cut. The cut on either side of the line should go right up to the thin white line previously engraved. The block is then turned round and the lines re-entered and returned to the upright line from which the start was made. The block is again turned so as to re-engrave the first series of thin lines with the No. 4 tint tool.

The block should now have the appearance of having all the black lines intact, not broken at all, and crossing one another just as they were drawn, with a line engraved on either side of them, the width of about a No. 4 tint tool. The pieces in the middle of the squares are now taken out with a scorper, and the depth of the engraving must be sufficient so that, when the block is rolled up lightly upon the surface with a composition roller charged with ink, the ink does not dip into the portions that have been engraved. Should the lines cross one another at any angle but a right angle, the No. 4 tint tool cannot be used, as the angles at the corners of the white spaces will not be square.

The method of engraving with a fine knife tool is the same; and it should be noted here that, if the cross lines are of different thicknesses, it is always the thick line that is outlined with the knife tool. The spaces are then taken out either with a square tool or with a graver, according to the shape of the piece to be engraved out. The method is as follows: The graver is pushed into the corner of the space to be engraved, at the same time the cut being kept alongside the drawn line. The cuts made by the graver are eight in number in each space to be taken out, two in each corner. The graver is held somewhat upon one side, so that the walls of the line are nearly upright. They must on no account be undercut, or the line, if a thin one, will break away. The middle piece of white is then taken out with the scorper as before. In using the scorper, by the way, it is advisable to put a thin piece of card behind so as to avoid burring down the lines with the belly of the tool. The scorper may have to be used in four different directions.

In engraving freehand facsimile such as pencil or pen-and-ink drawings, all the elaborate care necessary for first-class mechanical facsimile is dispensed with, and the student should at once accustom him- or herself to use the tools to the best advantage. Any ordinary facsimile work can be engraved by taking any white space in cross lines, no matter what shape, by one-cut of the tool or at most two cuts, that is, provided the space is not too large. The method is as follows: The tool is grasped firmly in the hand, the point of the tool is pressed into the most acute angle of the space to be taken out, it is then pressed forward to the next angle, which will be obtuse, and with a quick upward flick, at the same time pressing slightly forward and in the direction of the opposite angle, the tool will take out any moderate-sized space in a single cut. If the space is a triangle, it can be taken out in one cut by turning the tool over on one side enough for one side to cut the straight line, and the other the two angles. Should the space to be engraved be too large to be taken ut at one cut, the block should be turned round, when he opposite angle can be cut out also. The tool should e held at such an angle that the belly does not burr own the angle to be cut from.

There are three tools used for this purpose. The most useful one is the square graver, which will take out nearly any shape in a single cut, with the exception of square spaces (these can be taken out in two cuts) or very acute angles; then the cut would not be deep enough to print. The graver is used for all acute angles. The obtuse tool is a lozenge graver, with the face of the tool ground so that the cutting sides are at an obtuse angle. This tool will take out square spaces at a single cut and flick. The angle at which you hold the tool in relation to the block is the angle that will dig out the angle of the space without burring down the printing lines. The pressure of the upward flick to take out the opposite angle is an amount corresponding to the amount of pressure to take out the first angle up to the corners of the obtuse angles. Thus half the space is taken out with the dig-down pressure and the other half is taken out with the flick-up pressure.

When the lines of the drawing are too far apart to be taken out with the gravers, the white spaces should be taken out with scorpers or tint tools. The large pieces of white are not engraved out, but only engraved away from the work to the extent of about one-eighth of an inch all round, because it is easier to proof the blocks with these pieces in and also because nearly all wood engravings are printed from electros, in the process of which the large whites are more easily taken out. Single lines are engraved with graver, tint tools, or scorper according to the distance at which the lines are apart. The depth of the engraved portion should be such that a composition roller charged with ink will not ink any part of the engraving except the surface when the roller is passed lightly over the engraving. The parts that are engraved should be smooth at the bottom, and the walls of the printing lines quite clean and slightly wider at the bottom than the top.

It should be distinctly understood that the lines in wood engraving must on no account be in any way undercut, for, if this should happen, the engraving will not electrotype properly, as the wax impression will be caught in the undercut and dragged away. Also, if the lines are undercut and are at all fine, they will probably break away of their own accord whilst proofing.

TONE ENGRAVING

The student should practise engraving tints with the set of tint tools, so as to produce an even tone when proofed, without any unevenness or scratchiness. When this has been accomplished, wood engravings should be examined in order to get an understanding of the different methods that have been used to obtain a desired result.

There are the methods of single line, in which the lines run in one direction only, the wavy line, the flowing line, the crossed line, and recrossed line (white lines).

In white lining a sky to produce the best effect, the white line, that is, the vertical line, should be engraved first with all the different tones in the sky produced by tint tools. The main line, the horizontal line, should then be engraved across it. This gives much greater softness than if the main line is engraved first and then white lined.

To produce textures by means of dots, flicks and cuts, crossing and recrossing should be practised. Almost any texture can be reproduced. Portraits are, perhaps, the most difficult of all wood engraving, and the different methods should be studied from the best masters of the art. It is only by constant practice and hard work that one can become a good wood engraver.

CHAPTER V

ETCHING

THE copper plate of any required size (including plate mark) can be purchased, polished and bevelled, at any process-engraver supply stores. If the student prefers to polish the plates himself, the plate, when polished, should be thoroughly cleaned and freed from grease by rubbing the plate over with washed whiting or prepared chalk made to the consistency of cream by water and a few drops of ammonia 880. The chalk cream is used with a piece of clean rag or absorbent cotton wool, both free from grease and grit. The plate is then rubbed all over with a circular motion until clean water will remain upon it without stretching apart and showing bare copper. When this stage is reached, it shows that the plate is free from grease. The plate is now rubbed all over with chalk cream without ammonia, and is next set on end to dry. When it is dry, the chalk is polished off with a dry clean rag free from grease. The plate should now show a fine polished surface free from scratches.

There are two things to be careful about, the one that the plate must be free from grease, and the other that the plate should not be scratched in cleaning. If the plate is not free from grease, the ground may not lie properly, or it will peel off in places, causing endless trouble in the after work. If the plate is scratched, the scratches will print. This will not matter in certain classes of etching or on some parts of the plate, and must be left to the judgment of the student, but a scratch across a face would spoil the plate. Scratches can be removed by rubbing lightly, but with sufficient weight to cut the copper, with a piece of engraver's charcoal, or with a piece of wash-leather, charged with jeweller's rouge, spread over the tip of a finger. A deep scratch should first be lightly burnished until the burr is level with the surface, then rubbed with a stick of snake-stone ground at an angle of about 45° and lubricated with water, oil, paraffin, or turpentine, until the scratch is quite faint, then finished with the charcoal and rouge as above. The taking out of scratches should be practised upon a spare piece of copper before attempting upon the plate to be etched, as it requires some practice. It is not at all difficult, but requires patience. The worker should not try to do it too fast, and should see that all the materials used are free from grit, or there will be more scratches. The burnisher must be free from scratches, and lubricated by wiping it upon a piece of rag with a little beeswax dissolved in turpentine. If the burnisher should scratch the copper, it is effective to polish it with 000 emery paper and finish with jeweller's rouge until it is entirely free from cutting edges.

The copper plate, now being free from grease and scratches, is ready for coating. The principal cause of trouble at this stage is dust, and it is best to coat it in a room apart from all the cleaning dust. There are three methods of laying the ground: (1) with a piece of solid ground; (2) with a roller; (3) with a liquid ground. The etching grounds can be purchased from any artists' colour shop, and are sold opaque or transparent, either solid or in liquid. The opaque is generally used to start with, but it is purely a matter of fancy. The piece of solid ground is tied up in two folds of fine silk (a silk that is free from hairs) to form a kind of dabber. The plate is now made hot over a stove, then the ground enclosed in silk is brought into contact with the surface of the plate, when the heat will melt the ground. This will come through the silk on to the plate, which should be rubbed all over with a circular motion until it is quite covered. It is then dabbed with a silk or fine kid dabber until the surface is quite even all over. Great care should be taken not to make the plate too hot, or the ground will fire on and be spoilt; the heat should be sufficient only to melt the ground and leave it tacky for the dabber to distribute. Also great care should be taken to prevent dust from falling upon the plate, because the acid in etching will sometimes attack the dust, get through the resist and etch a black spot.

Having successfully laid the etching ground, some etchers blacken the resist by turning the plate face downward and holding a lighted taper under it until it is covered with black smoke. It is then gently warmed to make the black sink into the ground. By this method the lines drawn upon the plate can be seen more distinctly. The plate must not be over-blackened. If it is, it will not be absorbed by the ground, and will cause trouble by rubbing off on the operators' hands. Blacking the ground increases its acid-resisting properties.

No. 2 method, in laying the etching ground with a roller, necessitates the use of a flat slab of metal, stone or glass (a flat litho stone is best), and also of a gelatine roller with rounded ends set in a handle. Both can be purchased at any of the process-engraver's stores. It is the same kind of roller as that which wood engravers use to proof their work. To lay the ground, a piece of the solid etching ground is ground up upon the stone with turpentine and a few drops of spike oil to the consistency of cream. It is then rolled up with the roller in all directions until it shows quite a flat tone upon the stone, which should be cold. The roller is then passed over the copper plate (which should be slightly warmed) in every direction until it is completely covered with a uniform coating, and the plate should be made quite warm to drive off the turpentine and spike oil.

Instead of the solid ground, the liquid can be used by allowing it to dry upon the stone until it becomes like cream; add a little turpentine and a few drops of spike oil, then roll it up and coat the plate in the same way as above (these grounds can be blackened as No. 1).

If, however, the rolling slab is made hot, the turpentine will evaporate before the plate can be coated. Should this happen, add a little more turpentine and spike oil, and roll up again. The spike oil is used to prevent the ground from becoming brittle, and the amount to be used is a matter of individual opinion, but in any case the ground must not be too brittle, nor must it be sticky. When the ground is being rolled upon the plate, if the plate becomes too warm, the roller will be melted. Great care should be used to keep dust off the plate.

The third method of laying the ground is to use the liquid form of resist, pour it over the plate, and drain it off into another bottle, or use a collodion filter and pourer combined. This is an extremely useful bottle, and will save considerable trouble with dust. It is made in three pieces: a bottle with a wide mouth that acts as a funnel; a centre tube, which is ground to fit the bottle, has a groove cut in the opposite side to the lip to allow the liquid ground to be drained off the plate into the funnel neck of the bottle; in the lower part of the tube is placed a tuft of cotton wool, which should be soaked in the liquid ground before placing in the bottle, which has previously been half filled with the solution, allowing it to filter through the cotton wool into the tube ready to be poured on the plate. By this means the solution is always filtered. The third part of the bottle is an open stopper which acts as a cap and prevents the solution from evaporating when not in use. If the ground is dissolved in benzole or spirits of turpentine or xylol, the operation should not be carried on near an open light, lest there should be an explosion. The usual solvent for the ground is chloroform, which is not inflammable.

THE METHOD OF COATING THE PLATE

A small plate can be coated by holding the plate by the left-hand bottom corner, a pool of the solution being poured on the middle of the plate in such a way as to avoid air bells (a little practice will soon overcome this). The plate is then tilted so that the solution runs to the top right-hand corner (not off the plate). It is then tilted so that the solution runs to the left-hand top corner of the plate, and again tilted so that the solution runs to the left-hand bottom corner of the plate; but the solution must not be allowed to touch the thumb holding the plate. Then the plate is tilted so that the solution runs off it from the bottom right-hand corner into the funnel part at the collodion filter or into another bottle. While the solution is running off the plate, the top part of the plate should be swung with a slow movement from right to left and from left to right. When all the solution has been drained off, the movement of the plate should still be continued until the ground is set. The purpose of this movement is to get an even coating and to prevent streaks.

The plate should be cold and dry when the solution is being poured on, otherwise it may set before the plate is covered, and an uneven coating will be the result. This applies more to large plates than to the smaller ones. In coating plates too heavy to hold in the hand, a piece of wood 3 × 3 × 12 in., rounded at one of the 3 × 3 ends, should be mounted upright upon a bench, the round end at the top. The plate, which can now be balanced upon this, must be held by the left-hand corner and coated as before. The swinging movement can be carried out by holding the left-hand bottom corner with the left and the top right-hand corner with the right hand, the right-hand bottom corner pointing to the bench on which the remaining drip can fall.

The time taken to coat a plate should be the time to get an even coating. If the coating is done too quickly, the top part of the coating will be much thinner than the bottom part. If the coating is done too slowly, the solution will set before the plate is coated, and the result will be an uneven coating with streaks.

Although the plate should be cold when coating, great care should be taken that there is no moisture condensed upon it, lest the coating should not stick properly, and should cause endless troubles in the after work, such as the acid creeping through and etching parts in spots and streaks, the ground chipping away under the etching needle, or pieces flaking off of their own accord.

The plate having been properly coated, the next step is to draw, trace, or place the design upon the ground. There are several ways of doing this: (1) by tracing the outline upon it; (2) by drawing direct upon the plate; (3) by photo-mechanical process; (4) by drawing with the etching needle. The last is a method used by most of the painter etchers, because the work is more spontaneous.

First Method.—The drawing is made upon thin tracing or parchment paper with a lead pencil, or, better still, with a pen and waterproof ink. Another piece of thin paper should be well rubbed on one side with red chalk, or a piece of carbon paper can be used. The red chalk side of the paper is placed upon the plate; then the drawing on the tracing paper is placed upon that, drawing side down (as it must be reversed or the print from the plate will be the wrong way about). Then go over the drawing with a hard pencil or tracing point, with just enough pressure to trace the design upon the plate without damaging the ground.

The two papers can be kept in position by waxing the four corners of each and sticking it to the plate with beeswax. This will enable the operator to lift one corner to see how the tracing is going upon the ground. The ground must be quite dry or the paper will stick to it.

Second Method.—The drawing can be made upon the plate direct with a soft lead pencil or red chalk pencil, but it must be reversed.

Third Method.—A print can be placed upon the ground by the carbon tissue process. The plate with the ground upon it should be cleaned with washed chalk free from grit with a few drops of ammonia 880 added. The chalk, being the consistency of cream, is rubbed lightly all over the ground, care being taken not to scratch it, until water will flow all over it without its splitting apart. The plate is then coated with sensitised albumen solution—

White of egg	1
Water	20 oz.
Bichromate of potassium .	½ dr.

Dried albumen crystals, 70 grains, can be used in place of the egg. If the egg is used, the yolk must not be broken into the albumen.

Place the above mixture in a wide-mouthed bottle with some pieces of clean broken glass. The solution is then well agitated until considerable froth appears, and it is next placed aside to settle and agitated again and allowed to settle all night. It is then filtered through a filter paper into a measure or bottle. The plate should be thoroughly cleaned and free from grit, then covered with water. The albumen solution is poured on as in coating the liquid ground, drained off into the sink and coated again with solution. This can be drained off into the bottle, and filtered and used again. The albumen solution can be kept for a few days if three or four drops of carbolic acid (pure) are added to it; and the plate is now set to dry in diffused daylight. If there should be any signs of the bichromate crystallizing out, the plate should be washed under a light flow of cold water for five minutes, when it will be ready for the carbon print. Carbon transparency tissue can be purchased almost of any colour, and colour is a matter of fancy. If the ground is smoked black, red chalk colour should be used; if it is unsmoked or transparent, black or green is advised. The tissue can be purchased ready sensitized and will keep about a week, but, should it be necessary to sensitize it, the following mixture will be found useful—

Bichromate of potassium .	1 oz.
Water	20 oz.
Ammonia 880. . . .	1 dr.

For large pieces of tissue more solution will be required. The ammonia should be added after the bichromate is all dissolved. The solution should now be a pale lemon colour, and should be filtered into a dish large enough to take the piece of carbon tissue it is desired to sensitize, and the solution should be about half-an-inch deep. The tissue is placed or unrolled in the solution, at the same time all air bells being removed by gently passing the fingers across the surface of the tissue. Then, in order to remove these from the back, the tissue is turned over, and again it is turned face up, and kept under the solution. The tissue should not be left in the solution over three minutes, but it may be finished in less time. The instant it shows signs of curling backwards it is removed from the solution and squeezed upon a ferrotype plate, or upon a sheet of glass, which must be absolutely clean, and should have been rubbed all over with French chalk, then thoroughly polished off again. The ferrotype plate with the tissue should now be dried in a dry, warm room not less than 65° nor hotter than 75° F. This must be in a yellow light or in the dark, or only lit by weak artificial light, not daylight, arc lamps, or incandescent gas. When the tissue is dry it will strip off the plate or glass; it is then ready for printing; place it in a printing frame under a negative and print in daylight with an actinometer beside it. When the printing is finished, the print is squeezed to the albuminized ground by placing the plate in a dish half full of water, and soaking the printed tissue in the same water and removing all air bells as before. It should not be soaked for more than one minute. The plate and the print should then be brought into contact face to face, placed in position and squeezed together, and all the moisture should be wiped off with a piece of clean rag. The plate is then placed under some blotting paper to dry for ten to twenty minutes. In the meantime a dish larger than the plate should be filled with hot water 105° to 115° F., the plate with the print upwards is placed in the hot water, when, after about five minutes, the colour will begin to ooze out at the edges of the paper. At this stage the paper can be removed, by lifting up one corner and slowly stripping it off. If it does not come easily, leave it a little longer to soak.

The paper having been stripped off, the print can be developed by rocking the dish, or pouring over the plate the hot water from the dish with the hand or a cup. When the print is thoroughly developed, it is washed with cold water and set aside to dry.

The following points are worth remembering. Rubber gloves should be used when sensitizing, as the bichromate is poisonous. The sensitizing solution should not be above 60° F. The tissue should not be left in too long. The squeegeeing should be done with a flat squeegee firmly but lightly, so as not to tear the back of the tissue. The drying should be done in a non-actinic light or the tissue will be fogged. If the glass should not be thoroughly clean, the tissue would stick to it. The French chalk can be mixed with paraffin, but it must be thoroughly cleaned off or the tissue will not stick to the ground on the plate when developing. Blisters are caused by not having left the tissue long enough after squeegeeing and before development, or the water has been too hot to start the development, or the tissue not properly squeegeed to the plate. The carbon print on the metal plate must be a thin one, or it will flake off under the etching needle. The negative used must be a thin one if all the graduations of tone are wanted. The actinometer is an instrument for gauging the depth of a print, as the carbon tissue cannot be examined when printing (instructions for using the instrument are sold with the actinometer). The etching needle for cutting through the tissue should have sharp cutting edges, not a round one.

There are several other methods by which a photomechanical print can be placed upon the copper plate and also etched or partly etched, but as this does not come under the heading of engraving proper and would take considerable space to describe, and really belongs to a work on photo-mechanical processes, it cannot be discussed further here.

So soon as a tracing drawing or print has been placed upon the etching ground, the next step is to draw or cut it in with the etching needle. Etching needles are of various shapes and forms, and the choice of a particular kind must be left to the student. Some etchers prefer light tools, others heavy tools, also combinations of both are used, also roulettes, although it takes considerable skill to draw well with a roulette. The shape of scrapers for scraping off burr or reducing tones, and of burnishers for the same purpose, is purely a matter of fancy and will not affect the work in any way except in convenience of working.

Rat-tail files can be ground into excellent etching needles, with sharp, round-pointed ends for fine work, or oval ends, that is, the cutting end, ground at an angle of about 22°; thus, according to the size of the oval, more or less broad cuts can be made; they may also be ground with several cutting edges running down to the point by grinding the sides at different angles. A piece of wash-leather glued on to the part of the file held by the hand will make it nice and comfortable to hold. In grinding or sharpening the rat-tail files, or etching needles they should be first ground to the shape required on a medium carborundum stone with oil to lubricate, then on a fine stone, and, if round finished, on a piece of wood with fine emery or carborundum powder, 0000, with oil. The tool should be revolved in the hand whilst rubbing; 00 or 000 emery paper is very useful for finishing a tool, as it only polishes and does not cut. The scrapers can be made in the same way out of files, but it is better to buy them ready made. Some are bayonet-shaped, that is, three cutting edges, and hollow ground; these, when blunt, can be sharpened on a fine stone and finished on the emery paper, which should be pasted upon a flat piece of wood; this will take off all the burr if properly done. Tools are a matter of individual choice, and the student should choose a tool that he feels he can draw freely with.

The etching needle must cut through the etching ground and leave the copper bare, or the acid will not etch the copper. For very fine lines the cut of the needle will not require etching and should be stopped out (see Etching the Plate). When the darker parts are being drawn with the etching needle, the copper may be cut more deeply into, especially in the darks. The distance that lines should be apart from one another varies according to the work, but it may be taken as a standard to start with that the thickness of the etched lines should be about the same as the spaces left between them. For example, if the lines in the light part are one-hundredth of an inch wide, the space left should not be less than one-hundredth of an inch wide, but may be any width larger. This also applies to the dark parts. If the lines are placed too close together, the drawing will be lost by the spaces being etched away, because the dark lines must be etched deeply. Yet there is no need to be afraid of the want of tone, as it can be put in afterwards (see Second Etching). Thus, we want plenty of space between the lines to start with.

The student should not try to finish the plate at the first etching, as this requires considerable experience and skill, and often is of no advantage. It is better sometimes to start by only drawing in the outlines of the darker parts. The drawing now having been cut in with the etching needle, the next stage is to etch the plate. Before etching, the back of the plate, the edges and margin must be completely covered with a coating of acid resist, as asphaltum dissolved in benzole or turpentine, or shellac dissolved in methylated spirits with an aniline dye added. The dye will show if any part has been missed. The resist should be brushed on with a 1-in. flat varnish brush from left to right, air bells being carefully avoided, as they will sometimes etch. The plate should be allowed to dry thoroughly before etching or the acid will go through the resist.

Etching the plate is usually done with nitric acid or nitric acid and water, the Dutch mordant hydrochloric acid, water, and chlorate of potass, hydrochloric acid and nitric, or with perchloride of iron.

Etching with nitric acid one part, water one part, will give a vigorous bite. The bubbles that appear will give an idea of the activity of the etching. The time required depends on the depth required. The plate may be taken out at any period of the etching, washed with water under a tap, and then examined, but an ebonite plate-lifter should be used to lift the plate and a rubber glove or rubber finger stalls to hold the plate, lest the acid should burn and stain the skin. The acid can be diluted with more water, then the etching will be proportionately slower, which can be seen by the bubbles. The nitric acid gives off objectionable fumes, which are poisonous. The Dutch mordant does not give off bubbles, and the proportions can be varied, one part hydrochloric acid, one part water, one part chlorate of potass; it does not cut so quickly as the nitric acid. Hydrochloric and nitric acid, one part of each, with one part of water, can be used, and the proportions can be varied.

Perchloride of iron as an etching fluid has not been used to any considerable extent by etchers because it has not been understood, but it is the perfection of all etching mordants, it is not poisonous, and does not give off any fumes; it will etch the finest lines, and will also etch to any depth required. It does not burn to any extent, but it stains both clothes and hands; these stains, however, can be taken out with lemon juice well rubbed in. The solution of iron can be used several times; the plate can always be taken out, washed and examined, and replaced in the solution as often as required.

The iron perchloride can be purchased in lump or liquid form. If in lump, it can be dissolved by just covering it with water and bringing it up to the boil in an enamelled saucepan or an earthenware casserole pot. A bare metal pot must not be used, as the iron will etch any metal and its strength will be destroyed.

For preparing the perchloride of iron for etching we shall require a hydrometer (Baumé) for heavy liquids, registering from 0° to 50° or more; a cubic centimetre measure with a capacity of 250 c.c.; four bottles to hold the iron solution (the size of the bottles is governed by the size of the plate to be etched, also the amount of perchloride of iron), and some ammonia 880°; a thermometer (unmounted). If the perchloride of iron is purchased in liquid form, it will register about 42° to 45° Baumé; if in solid form it should be turned into liquid as above described, allowed to cool, and at the temperature of 60° to 65° F. it should be poured into the cubic centimetre measure to within an inch of the top (there must be enough solution for the hydrometer to float). The hydrometer is then placed in the measure (not dropped in, so that it may not strike the bottom of the measure and break) and allowed to float. The reading is taken from the scale on the hydrometer, where it floats on the top of the solution. A stock solution should be prepared to register 45° Baumé (if the solution is much stronger it will crystallize out and be difficult to re-dissolve). Should the solution register above 45°, water should be added to it. The formula for reducing the degrees of the solution is as follows: Measure out 250 c.c. of solution, and for every degree it is necessary to reduce add 10 c.c. of water at 80° F. Thus, should 250 c.c. of the solution register 49° Baumé, add 40 c.c. of water, which will bring the solution down to about 45° Baumé.

To the stock solution registering 45° should be added 1 per cent. ammonia 880. Thus, for every 100 c.c. of solution add 1 c.c. of ammonia 880. The solution should then be well stirred and brought to the boil, allowed to cool, and left to settle all night. A sediment will fall to the bottom of the solution, and the clear liquid can be decanted off and reduced to 42° Baumé with water, but the sediment should be kept to be used later. Two parts of the 42° solution should then be taken and reduced to 36° by adding water in the proportion given above. It is then poured into a bottle and labelled at 36°. Another bottle registering 30° is next made up by reducing some solution as before. The four bottles of solution now labelled should read 45°, 42°, 36°, 30°. The action of the perchloride of iron upon copper is as follows: The 45° solution will give a clean, deep cut to the copper and can be used locally with a sable brush in a quill (not with a metal ferrule, which would be eaten away). The 42° solution is used for the deep lines, giving a clean, deep cut; and the copper as it is etched will ooze out black. If a transparent ground is laid, which is advisable for etching with perchloride, the whole of the etching can be watched quite easily.

The 36° will not etch so deeply, and has a tendency to spread the lines, that is, to make them wider. This remarkable property will be found very useful when used with judgment. The solution 30° will etch slowly, and should be used for the finer lines or lines that should print grey.

The reason for adding the ammonia is to neutralize the free acid in the perchloride, with the result that the etched line is cleaner and sharper at the edges and also straighter down into the copper; by adding more ammonia the action of the solution is retarded, the cut being clean, but not so deep. There is also another consideration which is more important, namely, that through the rough addition of ammonia devils will never appear. These are spots that etch deeper than the work, with long arms stretching out in all directions, and are caused by gas produced in the etching creeping under the resist. They do not often appear in etching, but frequently in photogravure if the perchloride is not treated with ammonia. The perchloride will etch a good number of plates if the solutions are kept up to the degrees labelled on the bottles by adding fresh solution from the 45° bottle.

The sediment will be found useful when making up fresh solution. It can be added to the fresh perchloride of iron, only half the quantity of ammonia given in the formula being used. When the solutions have etched a number of plates, and the etching does not appear to be so deep or takes too long to get the depth required, all the solutions can be mixed together with the sediment, with the addition of some fresh iron, and boiled down to 45° Baumé. In this case the sediment and the copper in the old solutions will sufficiently neutralize the solution.

Should the student wish to undercut the line, that is, to make the line wider at the bottom than the top, or spread it in the dark part, a few drops of hydrochloric acid are added to a little perchloride of iron (not treated with ammonia), mixed in a saucer and applied locally with a brush. This can be examined quite easily by dabbing off the solution with a piece of damp cotton wool. If it has not acted sufficiently, another application is necessary. It will be seen from the above that the shape of the cut with perchloride of iron can be varied from a straight down deep cut, with walls almost perpendicular and a flat bottom; to a line undercut spreading at the bottom and holding more ink. The spreading of the lines can be increased by brushing the plate lightly with a mop brush or a smaller one in quill while the plate is being etched. Experience seems to show that the student should use the iron perchloride, as it can do everything that nitric acid can do and much more. It gives off no objectionable odour, it is not poisonous, and it is under better control than any other mordant.

Ammonia 880 should not be bought in large quantities by the student, as it is a very powerful and volatile fluid, the fumes of which will destroy the mucous membrane if inhaled from the bottle; it should be kept under lock and key to prevent anyone accidentally smelling it, and should be kept in a cool place. When removing the stopper, one should hold it away from the face. If by any chance the bottle should be dropped and broken, the operator must not attempt to mop it up, but should take himself out of the room and allow it to evaporate. If these precautions are taken there will be no risk.

To etch a plate where all the lines are comparatively equal, such as a plate in outline, and when the outline is wanted to print strong, we shall require a developing dish of stone-ware or of papier-mâché somewhat larger than the plate to be etched, an etching mop (this is a brush used by photo-mechanical etchers) or any soft brush without metal binding, a plate-lifter (ebonite), and a piece of wash-leather.

Place the plate in the dish and pour over it enough perchloride of iron 42° to cover it. The dish should now be rocked to make the solution flow backwards and forwards across the plate. The etching should start at once, and will easily be seen. Now observe whether there are any air bells on the plate; if there are, gently brush them off with the etching mop, but do not rub heavily for fear of spreading the lines. The dish should be rocked continuously and allowed to etch for ten minutes. It may then be taken out, washed both sides under the tap and examined. The etching is not deep enough yet to print a solid black line, unless the lines are rather thin. The plate may be placed in the solution again, but before doing so dab off all water with a piece of wash-leather wetted and wrung out. Next rock the dish and look out for air bells. The brushing off of these bells should be done very gently unless it is desired to widen the lines, in which case brush the plate all over with a circular motion, starting at the top left-hand corner of the plate and travelling to the top right-hand corner, then backwards and forwards, gradually coming down the plate; always keeping up the circular motion. But no part must be missed, or it will show when the plate is proofed. Only go once over the plate, then take it out and examine it as before: if the lines are not wide enough, return to the bath and brush again and examine.

As regards the exact depth to go, this can be judged only by the thickness of the line to be etched, and to do that it is necessary to see the plate, and by having a proof taken of the plate, one can then see if the etching has been too deep or not deep enough, both of which defects can be remedied, as will be shown later on.

The 42° solution will etch a fine line in a quarter of a minute or even less. A deep, strong line will take thirty minutes, a very deep line forty-five minutes. So the student will see that there is a very large range, but, as the plate can be examined at any stage of the etching, the depth can easily be seen with an engraver's glass. An average outline etching will take from twenty to twenty-five minutes to etch.

In etching a plate, a proof should be taken from the plate; if a copper-plate press is not procurable by the student, he will have to have one pulled by a copper-plate printer. (For copper-plate printing see Chapter X, page 102.)

Should the proof look weak, and the student wish the lines to print stronger, the plate should be rolled up, as described in coating a plate with the gelatine roller; or, if the lines are very fine, a glazed litho roller should be used in the same way. This type of roller does not push the ink into the lines so much, but it is necessary that the ink should go slightly down the sides of the lines, unless it is desired to widen them in the etching.

The plate, having been rolled up, should be warmed, then the back and borders and edges must be covered with resist as before. When dry, the plate should be placed under the tap to allow the lines to be filled up with water, for, if the plate was placed in the perchloride without wetting and all air-bells removed, the solution would attack some parts before others. The water having run freely into all the lines, the plate should be dabbed with the leather as before, placed in the 42° solution for two minutes. This will considerably darken the lines (the dish should be rocked all the time). The lines will have been slightly undercut because of the water in them, or slightly spread if the resist is not slightly down the side of the lines. It is well to remember that the hotter the plate is made after rolling up, the more the resist will run down the side of the lines, and the longer will be the time required to etch the plate to get the same density in the proof, because there will be less bare copper to etch away, but at the same time the lines will be sharper. To blur the lines and widen them, the plate should not be warmed; and to increase the width of the lines still more, use the solution 36° and etch from one to ten minutes according to the depth of tone required. Brushing as before described adds to their thickness.

To etch a plate by stopping out is a somewhat difficult method, and a good finished result can be obtained only by practice, considerable knowledge and skill. Suppose we wish to etch a landscape subject with a figure or figures in it, a copy or an original, (see Tracing the Design on Etching Ground). The drawing is made upon the resist with the etching needles or roulettes, and is finished as far as it is possible to go. The drawn lines through the resist to the copper should represent the subject as a finished picture. Cross-hatching is to be avoided as much as possible, especially in the lights. This is best done after the first etching, and, if put in at first, only tends to make the etching look as if much effort had been used to produce the result. All work that looks apparently effortless looks best. It is essential to keep the line balanced, no more black than white; cross-hatching may be put into the darks, but should be made with a finer needle than the main lines. The direction of the lines helps the etching to a considerable extent. Let the lines that form the drawing form the tones also, and it must be remembered that the drawing after all is the essential part of the plate in the first instance.

The plate is then placed in the solution 30° for two minutes, taken out, washed, and dabbed dry with the wash-leather, which has been previously soaked in water and wrung out. The dabbing is done lightly all over to take off the water. The plate is then slightly warmed and fanned dry. The highest lights are now stopped out, or, in other words, painted over with an acid resist. The best resist for this kind of work, where you wish to draw well and correctly, is litho ink, which is purchased in a stick, ground up in distilled water or boiled water (not plain water, which would destroy its acid-resisting properties), and slightly warmed to the consistency of thin cream. The parts to be stopped out are painted over with the ink, a sharp edge where it is wanted, and vignetted off thinly to blend with the next tone. If the softening off is not done carefully the tones will not blend but will be jumpy.

The plate is now warmed to set the litho ink, and then placed in the same solution for another two minutes, taken out, washed under the tap, and treated as before. The next tones in the lights are then stopped out and blended in, going at the same time over the first stopping out with the litho ink, warmed as before and replaced in the solution for two minutes. These operations are continued four, five or six times or more, according to the number of tones in the lights. All the other parts of the etching are left open and will be slightly acted upon by the iron solution. The etching of the lights having been finished, the plate should be warmed and fanned dry; then the remaining lights should be covered in as before. It is absolutely necessary that the plate should be quite dry; then the parts that have been stopped out are painted over with bitumen or shellac solution, except the edges that are softened off to run into the next tones. The plate is then warmed and fanned quite dry. On no account must the plate, after stopping out with shellac, be placed in any solution or wetted until the shellac is quite set and dry, otherwise the spirit in the shellac will absorb water from the solution, become rotten, and allow the perchloride of iron to penetrate, thus spoiling all the previous work.

The plate is now placed in the solution at 36° Baumé and allowed to etch for a quarter, a half, or one minute, according to the graduation between light tones and the light middle tones. The same operations are carried out as before, and the plate may be etched for any number of tones allowing the whole of the etching to take ten to fifteen minutes. Thus, supposing the number of tones in the light middle tone should be ten, then the ten minutes divided by ten equals one. In this case the plate should be etched ten times for one minute each time. This will give an even graduation if the edges are softened off. But, supposing that two or three or more of the tones are required to be much lighter than the next following, the two or three or more tones should be etched for one minute each as before, but the next tone being much darker should be etched for longer, one, two, three or four, or more, as the value of the tone is in comparison to the lighter tone which was etched last. The remaining tones in the middle light tones should then be etched according to their values up to the remainder of the ten or fifteen minutes. The fifteen minutes is taken when the range of tones is long and blends into the dark middle tones. The light middle tones are all painted in with the litho ink, and any big masses or sharp drawing should be carefully gone over with the shellac or bitumen.

We can next proceed to etch the dark middle tones, namely, those which start from the middle tone and range to the luminous black tones. The middle tone is stopped out as before. Supposing that the dark middle tones have a range of ten tones, and blend into the middle tone without any jump, take half of solution at 36° and half at 42° and mix together. This will give a solution 39° Baumé, in which the first tone of the dark middle tones may be etched for one-quarter of a minute. Wash and stop out as before. The next tone should be etched for twenty seconds; stop out. The next tone for twenty-five seconds, and the rest of the tones for thirty seconds, each tone being stopped out and the plate being thoroughly dried each time. Air bells should be lightly brushed off with the etching mop, but on no account must the plate be brushed heavily in this method. The time the plate has now been etched is as follows. Supposing the tones in the lights are five, as each tone was etched for two minutes this equals ten minutes in the 30° solution. Then the middle light tones are ten, and each one was etched for one minute; the time the plate was etched is ten minutes. This, added to the previous ten minutes, equals twenty minutes. The etching of the dark middle tone has taken in seconds 15 + 20 + 25 + 30 + 30 + 30 + 30 + 30 + 30 + 30 = 4½ minutes + 20 = 24½ minutes.

The subject has now taken 24½ minutes to etch to the black luminous tone. This should now be stopped in and dried as before. The plate should next be etched in the 42° solution for two minutes if all the black tones are equal. If it should be advisable to stop out some of the black tones to make them blend into the black luminous tone, the two minutes can be divided into four or more parts. Then proceed as before, etching and stopping out. Should the blacks not appear deep enough, longer etching must be given.

The perchloride of iron at 30° etches very slightly; the 36° etches, but also slightly spreads the lines; the 39° etches well and the cut is sharp; the 42° etches a deep, straight cut. The plate has now been etched for 26½ minutes. The lightest tone has been etched for two minutes with a very weak biting solution, 30°. The middle tone has been etched for twenty minutes, ten minutes in a 30° solution and ten minutes in a 36° solution. The luminous black tone has been etched in a 30° solution for ten minutes, in a 36° solution for another ten minutes, and in a 39° solution for four-and-half minutes. The black tones have been etched in a 30° solution for ten minutes, and for another ten minutes in a 36° solution and for another four-and-half minutes in a 39° solution, and in a 42° solution for two minutes; thus the plate has been etched for 26½ minutes, the lightest tone for two minutes and the darkest for 26½ minutes.

The plate should now be cleaned, first with spirit if shellac has been used, then with turpentine, then with chalk and ammonia, just as in cleaning the plate before coating. Should there be any resist sticking in the lines, it should be again cleaned with turpentine. If any dark green oxide appears in the lines, it should be cleaned out with a saturated solution of salt and vinegar or with diluted acetic acid. This acts best with the chalk and ammonia on the plate. The plate should then be cleaned again with chalk and ammonia, thoroughly washed under the tap, drained, dabbed with the wash-leather, and fanned dry, when it is ready for a proof to be taken.

It should be noted that the first proof is never a good one, and it is advisable to have three taken, one light, one medium, and one very dark. The proof should be a fair representation of what it is intended to produce, that is, if the work has been carried out properly; but it may look too dark, or it may look too light, or it may be too dark in the lights and not dark enough in the darks, or *vice versa*; but all these faults can be rectified.

Should the whole of the plate appear too dark, the surface must be rubbed down with a piece of fine felt charged with oil and 0000 emery powder. This will soon take off some of the surface, making it less deep, therefore not holding so much ink, and also making the etched lines finer. The etching can also be burnished locally in parts where it is necessary to lighten it, and can also be scraped with the scraper to produce the same result. Small parts where the tone should be lightened can be rubbed down with a piece of wood sharpened to a flat or a point, and charged with oil and 0000 emery powder. Bad drawing can also be taken out by rubbing the surface down as much as possible with a burnisher, and then placing the plate face downward on a flat piece of steel with two or three sheets of stout paper between, then hammering the back of the plate with a round-nosed hammer or a punch and hammer. Take the plate up occasionally to examine how the work is progressing (the exact place to hammer up should be found on the back by using a tracing). When the work is completely hammered out, the surface should be ground level with the rest of the plate with snake-stone, charcoal, or, if very slight, with a stick of wood and 0000 emery powder and oil. The snake-stone or charcoal should be used with water. The part having been hammered out and the copper re-surfaced, the etching ground should be relaid on the plate so as to cover outside the part to be re-etched. The rest of the plate can be painted out with acid resist.

The drawing should now be traced upon the resist and then carefully gone over with the etching needle to fit in with the rest of the etching on the plate. The plate should be etched as before. Should the lines in the lighter parts not give enough drawing or tone, they should be worked over with the dry point, and the burr thrown up by the dry point should be scraped off, unless they should be wanted in the print (see Dry Point Etching).

It is quite possible to turn a plate that prints like a thunderstorm into one that will print full of sunshine and brilliancy, so, with patience, all that is necessary is to scrape, burnish, polish, and re-etch until the required result is obtained. Subject etchings are seldom finished at the first proof, and usually not for many proofs afterwards. Before proofing the plate, it should be polished with chalk and water and dried, and at least two proofs must be taken. These should now show a decided improvement upon the first proofs, but, if they are not good enough, carefully study the difference in the first and second set of proofs. The student will then begin to understand the amount of work it requires to produce a certain result. This once grasped, the subsequent work upon the plate will be done with greater confidence and certainty. Now go over the plate as before, burnish, scrape, rub down, polish, use dry point and re-etch if wanted by rolling up (see Laying the Ground with the Roller). When you think you have gone as far as you should, have two more proofs taken and compare with the previous proofs. If the work on the plate has been done with confidence, the result will be pleasing; yet there probably will be much more work to be done before the plate is finished; go on with it, therefore, as long as you think you can improve it. Proofs should be taken occasionally. In the later proofs it is advisable to get the copper-plate printer to leave some tones of ink on the plate, of course under your direction, so that the effect of the etching may be improved (see Printing).

To go back to the first proof—should this be too light all over, the plate should be thoroughly cleaned and free from grease, and should then be rolled up. With etching ground with a litho roller, great care should be taken not to fill in the lines with the resist. Probably it will not be possible to avoid filling in the finer lines, as they have very little depth. These will have to be strengthened with the dry point or re-drawn with the etching needle on an etching ground and re-etched; the dry point is best in most cases.

The plate, having been rolled up, should be carefully examined to see how far the lighter lines are filled up or where they are partly filled up. In the latter case, these should be stopped out with litho ink and shellac as before. Then the plate should be placed under the tap to allow the water to run into the work and dabbed with the leather, then etched for one or two minutes in the 42° solution of iron. Two minutes will make a considerable difference in the depth of tone, or parts may be stopped out and several etchings given, not exceeding two minutes all together. Air bells should be brushed off lightly, and the dish should be rocked all the time. The plate is then cleaned, and the parts that had to be stopped in should be brought up to the required tones to fit in with the parts re-etched by dry point work or re-etching in the separate solutions they were etched in, in the first etch, as before described. Two or three proofs must be taken; should they still be light, re-etch as before. If they should show too dark, rub down as described before. Proofs should be taken from time to time to show the progress of the work until it is finished. If the first proof taken shows that the etching is too dark in the lights and too light in the darks, rub, scrape, or burnish down the lights and re-etch the darks, and proceed as before as long as is necessary. If the first proof taken shows that the etching is too light in the lights and too dark in the darks, work on the lights with dry point or re-etch, and rub, burnish, or scrape down the darks, and proceed as before until the plate is finished. It will now be seen that there is no limit to the amount of alteration that can be made upon a plate; in fact, just as is the case in painting a picture.

To etch a plate by starting in the darks, the plate must be grounded with one of the etching grounds as before. The subject that is going to be etched should be carefully considered, and the number of times it is proposed to etch the plate, which will depend upon the amount of work that is done upon the plate by the etching needle or roulette between the etches. Three questions arise—

(1) Is it intended to produce the effect by etching?

(2) Is it intended to produce the effect by the etching needle or roulette? (See Dry Point.)

(3) Is it intended to produce the result by combining Nos. 1 and 2. By the first method, supposing the etching is intended to have a range of tones up to twenty-five, in order to get the desired black in the darkest it will take twenty-five minutes to etch in a solution of 39°, or longer if the plate is large. The plate

should be etched twenty-five times for one minute each time. Each tone in the etching taking from twenty-five minutes down to one minute, the darkest tone has thus taken twenty-five minutes and the lightest tone one minute, and the other tones in proportion.

The range of tones may be any number from four or five to a hundred or more. Supposing there are five tones, the twenty-five minutes should be divided so as to etch the tones required. If, however, there should be one hundred tones, give each tone one-quarter of a minute etch, which will equal twenty-five minutes. But this is only when one tone is just one tone stronger than another. Should there be a jump in the tones, the etching should still have the same length of time, but those tones that are left out in the subject should be left out in the etching, and the tone that follows should have all the time of etching that the tones left out should have taken; thus, if twenty-five tones are continuously etched for twenty-five quarters of a minute, twenty-five continuous tones are missing in the subject, and the fifty tones should be etched for six-and-a-quarter minutes, thus producing the jump in the tones. The rest of the tones are etched as before described.

It must be clearly understood that, although the twenty-five minutes in perchloride of iron solution of 39° Baumé will etch a plate and give plenty of colour or tone when proofed, it by no means follows that this is the exact time that all plates should be etched. It depends largely upon the subject, the size of the plate, and also the method of handling the etching needles or roulette. A very small plate will take less time to etch because it is not advisable to have a small plate too strong. A large plate will take much longer, because a large surface requires more depth in the tones than a small plate. The etching needles govern the etching to the extent of the depth with which they are cut into the copper through the resist. Thus, to produce the same effect, should the lines with the etching needle only just cut through the resist to the copper, the plate will take longer to etch than a plate where the needles have cut deeper into the copper, because the cutting into the copper by the needles produces tone without the aid of etching (see Dry Point).

Supposing that the etching needles have cut half the depth in the copper to produce the result that is required, then the time in the etching solution should be reduced by half, the time required to etch a plate where the needles have only cut the resist to the copper.

The procedure to etch the plate for twenty-five tones which are continuous is as follows: The plate is grounded, and the darkest lines are then drawn in with the etching needle. The plate is etched for one minute in a solution of perchloride of iron 39° Baumé for one minute. The plate is washed under the tap and dabbed dry with the wash-leather (but not warmed). The next tone is drawn in with the etching needle. The plate is again etched for one minute (all air bubbles being lightly blown off), washed, dabbed, next tone added with the needle, etched, washed, dabbed, and so on for twenty-five times, a tone being added each time with the etching needle. Proof and correct as before described by etching, burnishing, scraping, dry point, roulette, etc.

In the above it will be seen that only the solution of iron at 39° Baumé was used. This was done to show that it is quite possible to etch in one solution, but for the finest lines it is best to use a solution of less cutting power. The student, by carefully studying the etching, will see that the same results may be obtained in different ways; also he should remember that it is advisable, when in doubt as to the values of the etchings, to have a proof taken before proceeding any further. This may be taken at any stage by the above method, but not by the stopping-out method, which should be complete before proofing.

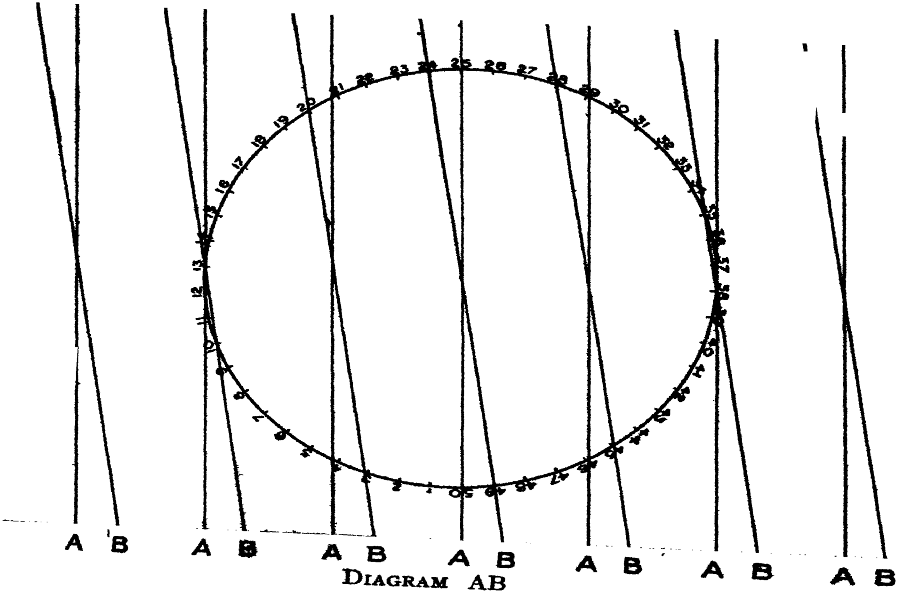
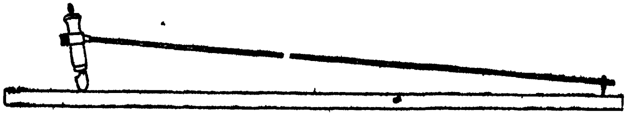

A
B

Diagram AB

the way the tool travels. Your elbow resting upon the table, if you rock the tool now from left to right, and now from right to left, it will begin travelling across the plate.

Should the tool not travel, it is not being held at the right angle, which should be very nearly 85° going forward, but varies according to the flexibility of the movement. The cuts on the copper should be quite even with a burr. This burr plays a very important part, and should not be scraped away during the operation of laying the ground. The second cuts or rocks should half overlap the first cuts in the same direction. Having gone all over the plate in one direction, one must turn it so as to cross the rocks first made. The plate is usually rocked in 50 to 100 different directions or angles all over the plate.

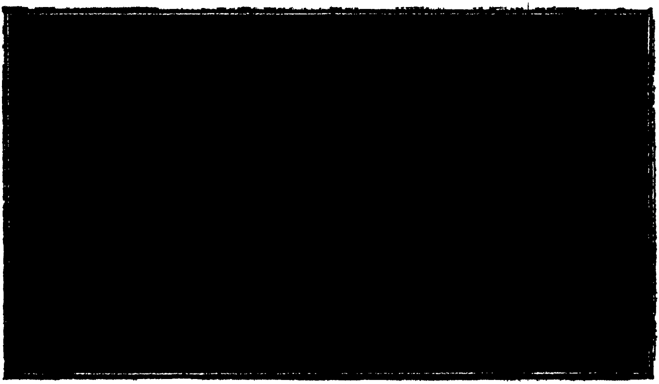


ROCKING POLE

A proof taken from the plate in this stage should print a rich velvety, even black. If the print is patchy, it wants more rocking. The finest grain is produced by using fine rockers with more lines to the inch, and also by rocking in a greater number of directions across the plate. (Laying the ground is by no means a pleasant task, and few mezzotinters ever ground their own plates.)

There is another way which is not so painful but is just as monotonous. The rocking tool is fixed at the end of a pole 6, 8 or 10 ft. long at the proper angle to travel, screwed into the bench is a large screw eye or ring, the pole at the opposite end to the rocker is passed through the ring, the length of the plate to be grounded, and by pressing upon the rocker, and rocking left to right and right to left, the rocker will travel along by either method. The amateur mezzotinter must be prepared for a laborious task, for on the proper laying of this ground depends the success of the grain.

The next step is to trace the design or picture upon the grain. To do this, fill in the grain, by rubbing washed whiting or prepared chalk all over the plate. The white should be dry when rubbed in the grain. The outline can now be traced upon the chalk by carbon paper under the tracing, which should be gone over with a fine pencil. A photograph can be used direct to trace upon the copper, but it must be reversed, or the design will print the wrong way about.



ROCKING MARKS ON PLATE ONE WAY

When the design has been traced, the next step is to scrape and burnish in the lights, starting with the highest light in the subject, then the next tones. At the same time care must be taken to preserve the drawing, and not at any time to touch the actual blacks in the subject.

As the work goes on, the picture will be seen as a picture in copper upon a white ground. When the subject shows distinctly, a proof may be taken. There is no reason for being disheartened at the result because it looks too black; it simply wants more working upon. The scraping and burnishing must therefore be continued. If the print proves too light, more rocking, scraping and burnishing will set it right. If, for instance, it should be found that a face or hand or any part is badly drawn, that part can be regrounded by rocking it up as before described. It does not matter if the rocking overlaps other parts, as this will all come right in the burnishing and scraping.

In reference to the burnishing and scraping, it is impossible to describe in writing how much to burnish or to scrape, except to say that the picture should look quite correct upon the copper, and will print much darker than it looks if the ground is rubbed in with white. Some mezzotint engravers rub in black, in which case the state of the plate can be judged better, but it does not seem to work so easily. Black copper-plate ink mixed with olive oil to prevent its drying will answer the purpose very well. The black or the white can be cleaned off with turpentine or paraffin.

It is not advisable to take many proofs from the plate in the course of engraving, or the fine burr in the darker parts will be worn away before the plate is finished, and the velvety richness in the darks will be lost. If many copies are wanted when finished, the plate should be steel faced, and at the first sign of wear, that is, the copper showing through the steel, the plate should be steel faced anew.

Scrapers are of various shapes and sizes. First, the triangular, having three scraping edges, hollow ground and tapering to a point. The flat double-edged scraper is sharpened back and front, having two cutting edges (Fig. 10). The knife scraper has one cutting edge like the blade of a penknife.

Burnishers are of many varieties—round, oval, flat, and in form are half-round, tapered and blunt at the ends.

The choice of burnishers or scrapers to work with depends upon the individual touch and also upon the class of work to be done. Heavy tools should be used for broad, big work, and fine, light tools for fine work. The scrapers should be sharpened upon a fine oil or carborundum stone, and the burr should be taken off with 00 emery paper pasted upon a strip of flat wood, by rubbing the scraper first one side of the cutting edge and then the other, at the same time pulling away from the cutting edge. It is very important that the burr on the tool should be taken off, as otherwise it will scratch dark lines on the parts that should print light.

Burnishers should be kept so smooth that, when burnishing on the bare copper, they will not scratch. A vaselined piece of rag should be used to lubricate when burnishing. If the burnisher should scratch, it should be rubbed upon a soft block of wood with the finest rouge and olive oil until the scratching edges have worn off. Great care should be taken with the burnishers to prevent their rusting; as with all tools the best plan is to wrap them up in oiled rags when not working.

Roulettes are extremely useful tools. Fine dotted lines or delicate tints can be drawn in while the work is in progress, work that could not be done with the rocker. Roulettes are made in all manner of shapes and degrees of fineness; they also vary from one line of dots to five, six, or more.

CHAPTER VII

DRY POINT ETCHING

DRY point is not etched with an acid or mordant, and the word etching applies to the print from the plate (which is also called an etching).

The method is drawing or scratching lines upon a bare metal plate. A ground is not required unless to draw the subject upon. A burr is thrown up by the etching needle, which is either scraped away, partly scraped away, or left to print as a luminous tone at the sides of the lines. The burr can also be produced more on one side of the line than the other by the inclination at which the etching needle is held.

The effect of the burr when printed is to give to the etching somewhat the effect of mezzotinting, but without any mechanical grain being shown, and at the same time to add considerably to the thickness of the line. The dry point will not allow many proofs to be taken from the copper plate, unless steel-faced (see chapter on Steel Facing). The burr wears away very quickly, thus altering the effect each time of printing, and about twenty-five impressions are about the limit that a dry point will give; but this varies according to the hardness of the copper, or, if dry point etching is done upon steel, the steel must be soft to allow the needle to cut without wearing away the point. The steel plate can then be hardened or copper-faced so as to produce more impressions. Proofing a dry point etching is exceedingly difficult, and very few printers are capable of doing the work properly, so that it is necessary for the etcher to stand by and direct the operation so far as effect goes. Once the right effect from the plate has been produced, the same can be repeated without any material difference to the end of the run (that is, the life of the plate), and this depends upon the care of the printer, as practically an indefinite number of proofs can be taken off if the plate is re-steel-faced as soon as it shows signs of wearing.

As regards the requisite tools, the dry point etching needle may be of any size and sharpened to shape as required. It may be round, like an ordinary needle, or may be ground lengthwise to give cutting edges to the point. The temper of the steel should not be too hard or the point will snap off, and it should not be too soft or the point will be turned up.

It will be seen from this that a dry point needle will give considerable trouble if it is not tempered properly. The temper of the tool is shown in the process of tempering by the colour produced by heat.

For instance, a piece of bright, hard steel (polished steel) held over a flame will first turn a pale straw colour, then to a darker straw, then brown, then blue, and, by its being rapidly dipped into oil the instant the steel has turned colour and allowed to remain in the oil until cold, a different degree of hardness will have been produced for each colour.

The colour that should be produced is the colour that is between the pale straw and the darker straw colour. The needle should be polished with 000 emery paper until quite bright, then held in a pair of pliers over the flame of a gas, spirit, or paraffin lamp, or laid upon a red-hot poker; but at no time is the point to come into direct contact with the heat applied. The needle should be held so that the heat is applied to the thicker part and the colour allowed to run to the point. Should the point of the needle come into contact with the direct flame it will be spoilt, and the only thing to do is to make the needle red hot and dip it into cold water. This will harden it, and the polishing and tempering can then be started over again.

Dry point needles can be purchased from any artists' colour shop, or they may be made from rat-tail files, darning needles, or any needle according to fancy. They can also be ground to any shape to suit the result desired. Diamond points are also used for dry point work. They are diamond chips, mounted in metal, attached to a wood handle. They are rather expensive, but with care last a considerable time. As regards the method of using the needle there is nothing special to say except that the lighter you press it the finer the line, and the needle may be drawn in any direction.

The whole secret of dry point work is that the drawing must be absolutely good, free from effort, and quite spontaneous; if not, the result is much more disappointing than any other method of etching or engraving. Proofs may be taken at any stage of the work, but it should always be remembered that without steel facing the life of the burr is not long. The burr can be scraped off portions of the work, and left upon others to produce effects of light and shade, or the burr may be taken off altogether, a proof taken, and the plate worked in over and over again until the desired result is achieved.

The student practising dry point will be advised to sketch in the subject lightly, scrape off the burr with the scraper, and have a proof taken, then to do some more work and take another proof, and so on, proofing and building up the work. By this means he will, by comparing his proofs of the different stages and remembering the amount of work he did to the plate at each stage, learn considerably more than by attempting to attain a finished plate at one needling, which could be produced only by considerable practice and experience. (*Note.*—There is also a charm about dry point with the burr scraped off that is all its own.)

CHAPTER VIII

MONOTYPES

A MONOTYPE is a drawing or painting upon a metal plate which, when printed upon a sheet of paper in a copper-plate printing machine, has the appearance of an aquatint or mezzotint, but only one or two proofs can be taken. The method of production is as follows: A highly-polished sheet of copper or zinc or any other metal should be bevelled at the edges, to produce a plate mark. The plate may be placed upon an easel or on a slanting board upon a table. Some copper-plate printing ink of the desired colour is requisite. It can be made by grinding any powder pigment with copper-plate varnish, upon a flat stone, metal, or sheet of thick glass with a muller. A muller is a piece of stone or glass, flat at the bottom and heavy enough to grind soft pigment. Some powdered pigment should be placed upon the stone or glass with a drip or two of copper-plate varnish.. These must be worked together with a pallet knife into a smooth paste, which should be then ground with the muller with a circular motion until quite free from grit, although it will be found much more convenient to buy half-a-pound of ink already ground. This can be purchased from any printing ink manufacturer. There are two ways of using the ink upon the plate.

(1) The ink is first ground to the desired consistency for convenience of working. The design or picture is then painted upon the metal plate with a hog-hair brush, in exactly the same way as if painting it upon paper or canvas, using any means that are most suitable

for the purpose, such as wiping out lights with stumps covered with fine butter muslin, sticks of wood sharpened to draw detail in the lights, fine brushes to draw dark detail, or any method to produce a good result. Should the drawing take more than an hour, it is advisable to grind a drip or two of olive oil (salad oil) with the ink. This prevents it drying upon the plate, and, if the drawing should take more than a day, more olive oil is required.

When the drawing is finished, the margin of the plate should be cleaned with butter muslin and a little turpentine. The plate should then be slightly warmed and the proof taken. If there appears to be enough ink left upon the plate after the first proof, the plate must be made much warmer and a second proof taken (see Copper-plate Printing).

(2) The second method is to ink the plate up solid black with a dabber or proofing roller. The work upon the plate is then done by wiping out with brushes, rags, sticks of wood, or any such means, or the plate can be rolled up with sufficient ink to produce a grey tint, the lights wiped out and the darks painted in. It should be distinctly understood that, if it is intended to use the same metal plate over and over again for different subjects, the plate must not be scratched in the operation of producing the subject. Should the student wish to produce different effects with the same design, the design can be etched in outline upon the plate, and the plate worked upon with the ink as before described. Coloured proofs can be made by the same methods, using oil paints, mixed with the medium of olive oil and turpentine to prevent the paints from drying upon the plate. The monotype, although not strictly an engraving, resembles an engraving in the proof.

This method has been described because so many pleasant hours of an evening can be spent by anyone possessing a copper-plate printing press, and, if the inks are used in a somewhat more liquid state, an ordinary wringer with rubber roller can be used for taking the proof. The exact consistency of the ink should be such as will print upon the paper used, which can only be ascertained by the result you wish to produce and practice.

(*Note.*—If the ink is too sloppy, the proof will smudge and run. If the ink is too solid, it will not print cleanly upon the paper.)

The proofs will also vary according to the paper used, unsized papers taking the ink much better than sized, smooth better than rough, damp better than dry. (To damp the paper see chapter on Copper-plate Printing.)

The prints will also vary according to the pressure used in taking the proof. The pressure is not so great as in proofing etchings, as the ink is all upon the surface of the plate.

CHAPTER IX

PROOFING WOOD ENGRAVINGS

WHEN a wood engraving is finished, or before a proof is taken, the engraving is rubbed smartly all over the surface, two or three ways, with a piece of pure rubber. This will take off the drawing and allow the ink to take better. Should the engraving have been cut through a photograph upon the wood and the photograph be at all loose, it should be all rubbed off with the rubber. The removal can be assisted by breathing upon the surface of the photograph. Materials required are these: A clean litho stone, 15 in. × 12 in. or larger; a durable composition roller set in handle for letterpress, rounded at the ends, and about 6 in. long; one-quarter of a pound of the best proofing ink, an ink push knife, and a burnisher. This last should be of the French type, about 9 in. long, and should be curved at the bottom, although almost any burnisher will do. The French burnisher will take a proof in about half the time, without so much risk of spoiling the engraving. Other requirements are a piece of paraffin wax, a piece of ivory card (a lady's visiting card will do), rags, turpentine, a sharp penknife, and proofing paper (India paper). To take the proof, well rub the engraving with the rubber and stand on one side, then clean the litho stone with turpentine and rub dry.

Take a piece of ink about the size of a small Spanish nut, place it near the top left-hand corner of the stone, and drag it backwards with the push knife into a streak about 5 in. long. Then take the roller and charge it all over with ink from the streak; then, in the middle of the stone, work the roller about in all directions so as to distribute the ink into a fine film, free from bits of dust. The ink should now be of such consistency that the roller, when rolled upon the knuckles of the left hand, leaves a black deposit of ink quite even and fine in distribution. If there is enough ink, re-roll from the streak and roll up as before; if there is too much ink, re-roll on a clean part of the stone. It should be distinctly understood that the ink must be evenly distributed upon the stone and roller and that it is better to have too little than too much.

In distributing the ink, pressure should be used upon the roller, but, just before inking, the roller should be drawn lightly towards you from the top of the slab to the bottom, only one way; that is, the roller should be lifted from bottom to top and then drawn towards you to the bottom. The reason for this is that the ink will be finer and more even upon the roller. The engraving should now be taken, if not too large, in the left hand, and the roller passed lightly across the surface in several directions. To judge the amount of ink that should be rolled upon the surface is a matter of experience and cannot be described accurately, as different engravings take different quantities. A diagram will take very little ink, whereas a night scene will take a considerable quantity. On no account should the ink be allowed to run down the side of the lines, or the proof will be smudgy and bad. Therefore, it will be seen that for the first proof the engraving should not be inked up quite fully. The next step is to take the proof. The piece of ivory card should be rubbed on both sides with the paraffin wax. The object of this is to make it slip over the proofing paper, and the burnisher slip upon it. A piece of proofing paper is then placed upon the inked engraving; this should be a little larger than the block. The piece of card is placed upon the middle of the engraving and gently rubbed all over the back of the proofing paper, thus sticking the paper to the inked surface of the engraving. The burnisher is then rubbed upon the back of the card, which must at the same time be moved all over the engraving. The proofing paper may at any time be partly lifted up to see how the proof is progressing and replaced by smoothing it back with the card into the same position again. Thus, the more the burnishing, the blacker the impression becomes, and it is quite possible to vary the amount of ink taken up by the proofing paper. When the proof looks sufficiently burnished, the proof should be lifted from the surface of the block. The proof now shows the state of the plate. Next, the engraved block should be brushed over lightly with the palm of the hand, so as to take off any surplus ink, and also to make the lines bright.

The engraved block can then be retouched, but before doing this a piece of paper or thin card should be placed under the thumb to prevent any ink being rubbed in between the lines. Now suppose that the engraved block is a facsimile engraving, that is, a drawing in line, and there may have been large pieces of white which have not engraved away and will print black upon the proof. To obtain the proof without the pieces of black showing, the proof should be carefully cut out with a penknife (or the side of the face of a tool can be used); the piece or pieces of black should be placed, black side up, upon a piece of paper, the block inked up as before, the pieces of black on the block covered with the pieces of black proof, black to black, and made to stick by rubbing with the burnisher. Now it is only the engraving showing. The proofing paper must be placed upon the block, and the process of taking the proof must be continued. If the engraving is of very thin lines, the proofing paper may slip when proofing, so it is advisable to place very small pieces of beeswax here and there upon parts of the overlying paper that stop out the black parts. This will keep the proofing paper in position, and also, should the pieces of overlay paper not stick well to the block, a very small touch of ink can be placed on the block to make them do so.

To clean the ink off the block, brush well and strongly in one direction only at a time, then turn the block round and brush in the opposite direction with a piece of pure lump rubber, not vulcanized rubber. To proof grey lines or vignetted, the block, after inking, should be lightly rubbed or dabbed with the finger or paper stump upon the lines or edges that are wanted to proof grey. If faking is adopted, proofs by hand can be very much improved by burnishing with care upon parts of the proof, so as to render the tones softer by blurring the lines, and by making the burnisher hot this will become still more pronounced. Lines and tones can also be greyed down by brushing them over with washed chalk, which can be applied with a sable brush when the proof is fresh, care being taken not to allow the chalk to go upon any but the parts to be greyed. All surplus chalk should then be taken off the surface, and only that amount that has stuck to the ink left upon the proof. Proofs are also taken on proofing presses and machines, but, as this is essentially a printer's art, the process will not be described in this book.

CHAPTER X

COPPER-PLATE PRINTING OR PROOFING

THE copper-plate printing machine is of the simplest construction, the principle being nothing more nor less than a large mangle with a flat steel bed in between the rollers ; in fact, small proofs can be taken between a strong pair of rubber wringers, but for large work it is necessary to have great pressure and continuous movement. Then the machine should be geared to run slowly. The top or the impression roller is lapped with swansdown and copper-plate blankets, which squeeze the paper into the engraving, etching, mezzotint, or photogravure, and the ink is sucked up by the paper from the intaglio lines, dots, or grain.

The method of taking an intaglio proof is the reverse of that of surface printing (wood engraving, letterpress, lithographic printing). The intaglio plate is inked into the lines and all over the surface of the work to be printed. The surface ink is then rubbed off with fine canvas and muslin, the ink being left in the lines, dots, or grain. The plate is then placed on the bed of the copper-plate machine, a piece of damped paper is placed upon the engraved plate, the plate and paper are wound through the two rollers and the impression is taken. Although this sounds very simple, it is by no means so easy as taking an impression of surface printing by hand.

Plant and materials required are copper-plate ink, copper-plate varnish (thick and thin), pallet knife, muller and stone, printer's push knife, copper-plate dabber, copper-plate canvas muslin, butter muslin, whiting, copper-plate paper, India paper, starch, powdered French chalk, hot plate fitted with gas-ring with a piece of asbestos the size of the top of the plate, turpentine, and drying boards.

Damp paper is nearly always used for proofing engraving and etchings, the kind commonly used being copper-plate paper and India paper. These papers are unsized and naturally absorb the ink much better than sized papers. The thin India paper is coated upon the back with a paste made of starch, and can be allowed to dry. The plate paper is damped by wetting the back of it with a sponge and clean cold water. The sheets are then packed upon one another and allowed to stand all night or longer between two boards, to allow the paper to become evenly saturated with moisture. The paper must not be too wet, nor should it be dry, and only so much of it should be damped as can be used in the course of three or four days, because, if the paper is kept damp for a much longer period, it may become mildewed and spoilt.

A copper-plate press, one that is geared, is the best, although some of the finest prints have been taken on the old spoke-wheel press, which, however, takes much more skill to turn. Some printer's swansdown blanket is required, also some fine printer's blanket, both of which should be a little larger than the largest sheet of paper that will be used upon the press. When buying a copper-plate press, it must be remembered that the size of the paper governs the width of the bed of the press, and at least an inch each side of the top roller should not be used. Thus, if it is desired to print a proof on a sheet of paper 10 in. wide, the press should be at least 12 in. wide and the copper plate should not be wider than 8 in. The bed on copper-plate presses is always made long enough to take any size within reason.

Thus, a copper plate 16 × 8 could be printed upon a 12-in. press. The pressure of the press is direct, that is, there are no springs; the top roller is simply screwed down to get the proper nip, or squeeze. Some printers place half-a-dozen or more pieces of hard cardboard between the pressure blocks on either side of the press, which give the press a very slight spring, the actual spring being in the blankets. The bed of the press is of planed iron or steel about 1 in. thick.

A sheet of zinc about 22 gauge should cover the bed. This prevents rust from printing upon the paper and is easily cleaned.

As regards the method of making a print, it is necessary to see that the edges of the copper plate have been bevelled, or the blanket may be cut when taking the impression. If the blanket is cut, it is spoilt. The edges of the plate are bevelled with a small metal plane. The plate should be placed upon a bench or strong table, the edge to be planed overhanging about a quarter of an inch, with a stop of wood screwed upon the bench to prevent the plate from being pushed round in the planing. The plane is then shot along the edge of the plate until the desired bevel is obtained, and it is finished with snake-stone and water, and finally with 000 emery paper, or charcoal, and burnished. In the process the corners should be slightly rounded the exact shape of the bevel.– The width is a matter of fancy, because the bevelling is done not only to preserve the blanket, but also gives the plate mark upon the finished proof.

For inking the plate, copper-plate printing ink can now be bought from any ink makers, and also of any colour, although many copper-plate proofers prefer still to grind their own, and for large etchings, where there is plenty of colour, inks of different fineness and thinness in grinding are used so as to give a greater depth of tone to the darker portion of the print. Pigments can be purchased at all artists' colour shops and also from some of the ink makers.

The grinding of the ink is done upon a stone with a muller. A small quantity of pigment is placed upon the stone, a little copper-plate varnish is mixed in it with a pallet knife, it is then well ground in with the knife, and afterwards well ground up with the muller. The exact proportions cannot be given, as different pigments take more or less varnish; also the consistency of the ink varies with the plate to be printed. The usual consistency is that of thick cream, but, should the proof from the plate print too light, the ink can be strengthened with more pigment; and, should the proof be too dark, the ink can be reduced with more varnish. There is considerable latitude in the amounts that can be used. In grinding the pigment with the muller, care should be taken not to leave any grit in the ink that may scratch the plate in the wiping operation. Ink that is purchased ready ground is usually too stiff and requires mixing with a little varnish. Here, again, the two varnishes, thick and thin, can be mixed together to produce the required consistency. It is better for the student to buy the ink already ground, as the grinding requires considerable experience.

To ink the plate, take a piece of ink about the size required to ink the plate all over, and mix with a small quantity of varnish with the pallet knife. Then rub together with the muller, and charge the copper-plate dabber with the ink, by dabbing. Now place the copper plate upon the hot plate, the temperature of which must be about 120 F., which, however, varies according to the stiffness of the ink used. The work on the plate is dabbed all over with the dabber charged with ink, the warmth of the plate allowing it to run into the work. The plate then presents the same appearance as the ink slab. A piece of canvas muslin is made up into a pad and brushed round the plate in such a manner as to take the ink off the surface without taking it from the lines, dots, or grain. The plate is then wiped with a pad of fine butter muslin and also with the palm of the hand. The white margin of the plate is then wiped clean with fine muslin, which has been rubbed upon a piece of whiting, to remove all surface ink and allow the margin to print clean white. During these operations it will sometimes be found necessary to take the plate off the hot plate and allow it to cool somewhat. This will allow more ink to be left in the plate. The muslin pads can be warmed before wiping, and tones of ink can also be left on the surface to produce greater depth of tone in the finished state. After the plate has been wiped clean, the ink can be partly drawn from the lines on to the surface of the plate to produce depth of tone in the print. Considerable difference can be made in the finished print by the printer from the same plate; in fact, two printers will very seldom produce the same result from the same plate, unless it is a clean wiped plate. It is therefore advisable for the etcher or engraver to see the plate proofed and to give instructions to the printer as to the tone or tones left upon the surface of the plate, unless the engraver proofs his own plate, in which case he will engrave to produce a certain effect by proofing.

In the process of pulling the proof in the press, a sheet of zinc about 25 B.W. gauge should be laid on the bed of the press to prevent rust off the iron bed from printing upon the margins of the plate. A piece of plate paper the size of the proof should be pasted on to the zinc and the margin marked upon the paper so that the copper plate can be placed always in the same position on the press, and the sheet of proofing paper can be registered in the same way in such a position that the bed of the press can be wound through the rollers.

A piece of swansdown and a piece of fine blanket somewhat longer than the plate paper should be placed upon the bed in the following order: The plate paper pasted to the zinc by the corners, another piece of plate paper placed upon that, then the fine blanket, and on the top the swansdown blanket. The top roller should now be screwed down with the adjusting screws, and the press turned so that the bed travels through the rollers. The pressure must be quite firm, but not dead tight, because the copper plate has to go between, and it is upon the copper plate that the pressure is wanted. The inked and wiped copper plate is placed face upwards upon the registered margin, and a piece of damped proofing paper face downwards over the copper plate, so that it registers with the paper beneath. The press being revolved continuously, the extra pressure will be felt as the plate passes under the top roller. The same speed of winding through must be kept up, and on no account should the press be allowed to stop whilst taking the proof, or there will be a mark across the plate. After the plate and the paper are wound through, the blankets are lifted over the top roller, and the proof is lifted from the plate. The plate mark should now be examined on the proof. If the paper is cut by the copper plate, the pressure is too great ; if the plate mark is weak, the pressure is not sufficient.

To proof upon India paper, a piece of the starched India paper is cut, about half-an-inch or more smaller than the copper plate. It is then damped with a sponge and laid in position facing the copper plate. A piece of damped proofing paper is placed on the top in register as before. The plate is then pulled through the press. When the print is being lifted, the India paper should have stuck to the proofing paper and both come away together. If the India paper does not stick, it has not been properly starched.

Vellum proofs are taken in the same way as prints upon copper-plate paper.

During the operation of printing the hands become covered with ink, and it is advisable to have a box of French chalk (powered talc) in which to dip the fingers. This must be rubbed off, of course, but the object of its use is to prevent the fingers from marking the proofing paper. A piece of paper folded as a clip is useful in lifting large pieces of paper, for by this means the proofing paper does not come into contact with the hands.

For proofing in colours, the plate is first of all inked in with a pale neutral grey colour to which three or four drops of olive oil have been added, then it is cleaned as for printing. The addition of the olive oil is to prevent the ink from drying upon the plate. In inking it is advisable to start with the stronger colours first. Suppose we start with the blue. The parts that are to print blue should have the grey colour wiped out by a soft rag or with spills of paper, which may be damped with turpentine or paraffin to assist the removal of the ink, although it is not necessary to take it all out. The blue ink is next dabbed upon the parts of the plate that are to print blue in the finished proof. The plate is cleaned again as for printing, then another colour is inked in, and again cleaned, and so on with the rest of the colours, the light colours, such as for faces, being the last. These operations take some time, large plates requiring a day or more to ink in. The plate is then wiped all over, warmed, and proofed, as before described.

The object of inking in the plate with grey ink is to protect the parts from being filled up with any other colour, but the one that should be filled with the small amount of grey ink left in the plate also pulls the colours together, joins them up, and softens. Proofs, when taken from the press, should be interleaved with tissue paper, placed in twos or threes between drying boards, and kept in a warm room until dry; otherwise the proofs will not dry flat.

CHAPTER XI

THE ENGRAVER'S STUDIO

THE accessories required are—

(1) A table, which should be large enough for the work required ; an ordinary kitchen table 3 ft. × 2 ft. will do for a small-sized plate.

(2) A drawing board 2 ft. × 1 ft. 6 in., which should be raised up at the top to form a slanting desk, and the amount of slant should be such as to suit the student so that he can most conveniently work upon it.

(3) An open framework of wood 4 ft. × 3 ft. A canvas stretcher without a cross-bar will do, or an old light picture-frame, on which should be stretched a sheet of tracing paper, tracing cloth, or tissue paper, pasted or pinned on. This frame is used to diffuse the light and to enable the work to be seen without unnecessary glitter from the metal. The frame should be as large as the table, which should be placed in front of a window so that the student faces the window while working upon the plate, the slanting drawing board upon it. The frame to diffuse the light should be stood upon the table, behind the top part of the drawing board, and should then overhang the table and drawing board at an angle of about 45°, the top part being attached to the window-frame by pieces of string to rings or hooks, so that by shortening or lengthening the strings the correct angle at which the light is diffused over the metal plate will be obtained. The exact angle cannot be given, because it is also governed by the slant of the drawing board, which is a matter of individual taste.

Strong reflected or direct light from any other source should be prevented from falling upon the plate by blinds. When the work is done by artificial light, the light should be placed behind the diffuser. The object for the diffuser is to prevent strain upon the eyes, and much better work can be done with than without it.

(4) A rest for the hand to prevent constant rubbing upon the plate. This rest is made of thin wood about ¼ in. thick, 4 in. or 5 in. wide, and about 20 in. long; at either end a similar piece of wood 2 in. wide is glued or screwed on so as to stand over the plate. The hand rest should not touch the surface of the plate. It is advisable to have all sharp edges of the hand rest bevelled off, thus making it more comfortable to work with. If the table has a drawer to it so much the better; if not, a small box can be screwed at either side to hold tools, etc. All tools should be wiped over with an oiled rag after use before putting away, as they will soon rust, and many a delicate burnisher, scraper or needle may be spoilt. (The oil should be wiped off before using the tool.) It should also be noted that these hard tools will easily dent or scratch one another, and should not be pitched into the box or drawer in a heap. The best way to take care of them is to roll them in an oiled cloth or wash-leather; this will save endless trouble while working.

(5) A fine oil or carborundum stone for sharpening the tools.

(6) An oil can for oiling the stone.

(7) A few sheets of 000 emery paper (not cloth) for polishing the burnishers and the plate.

(8) A piece of snake-stone for rubbing down work on the plate or for removing the same.

(9) A piece of engraver's charcoal for finishing after the snake-stone; this should always be kept in a covered jar of clean water.

(10) A small bottle of jeweller's rouge for further polishing.

(11) Some rags and a wash-leather for dusting and cleaning.

(12) Tools are described in the working chapters.

It is also advisable to have in the studio examples of the work that the student wishes to do. They should be by any of the best masters. It is not always the print that fetches the highest price that is the best of its kind, nor are all the works by any one master masterpieces. By having in the studio examples of the best work, the student will be able to compare a proof from his own plate, and this will enable him to study the parts where he has gone wrong, and help him to make the necessary corrections.

In the taking of proofs considerable difference will show even from the same plate if it is proofed by different printers. This applies principally to etchings, as the actual state of the plate (that is, a plate that has been clean wiped) is quite different from the finished print which has been made under the direction of the etcher, owing to tones of ink having been left on the surface to produce the desired effect (see chapter on Printing).

(*Note.*—To save trouble keep all tools bright and free from rust.)

CHAPTER XII

STEEL FACING

STEEL facing is absolutely necessary if a long run (many impressions) is required from copper plates, especially mezzotint engravings, as these are worn in the deep shadows in about twenty-five impressions, and the beauty of the depth of tone begins to diminish very rapidly unless the plate is steel faced.

The steel face can easily be removed as soon as it shows signs of wearing, and the plate can then be re-steel-faced again and again, until all the impressions that are wanted are taken from the plate, without the plate having to be touched up by the engraver. It is a question whether the steel facing detracts from the beauty of the plate or whether it enhances it. Perhaps the better opinion is that the plate is considerably improved by it and that it is made much easier to proof from.

Steel facing, as it is known in the trade, is not steel at all, but simply a deposit of iron upon the copper surface, which being much harder than the copper surface allows the plate to be printed a considerable time longer without wearing out the plate. Steel facing is quite a simple operation when once the bath is in order. The method is as follows: A tank is required about twice the size of the largest plate to be steel-faced. Thus, if the plate to be faced is 24 × 20 in., the tank should be 48 × 40 in. inside measurement. The tank stands upright upon the 8 × 48 in. end and should be made of slate, with red-leaded joints overlapping the end and bolted together outside, or it may be made of teak in the same way and filled up with water for some days, to allow the wood to swell until it does not leak. There must also be provided two pieces of stout sheet iron—Swedish is the best for the purpose—having two holes bored in one end so as to hang them with copper hooks upon a copper or brass rod, which should rest upon the top of the tank. The plates ought to be for the above size 40 × 36 in.; and be hung on either side of the tank, 1 in. away from the side, not touching the bottom of the tank.

The electrolyte or solution for depositing is as follows: Powdered sal ammoniac (chloride of ammonia), one pound to one gallon of water. Place the sal ammoniac in a muslin bag and suspend it in the water, allowing it to dissolve. (*Note:* The solution should not cover the copper hooks.) The current for depositing can be taken from the ordinary electric supply for power or from the house supply. The following is the method: Mount upon a board incandescent lamps in the form of a resistance (the old kind of lamp, not the metal filament, is the best, as it allows more current through and fewer lamps can be used). The lamps should be mounted in parallel, as by this means the number of ampères can be registered by more or less lamps according to the number of square feet it is registered to deposit. The current density should be from 1 to 1·50 ampères the square foot, although in striking on as much as 2 ampères can be used, but not for long, or the steel facing will peel off. The deposit should strike on in a minute and the current must be reduced to 1·35 by taking out the necessary number of lamps. The lamps take up all the voltage, except that required for the bath.

If an electric supply is not available, use Smees' batteries, which should be adjustable so as to allow the proper amount of ampères the square foot.

The tank now being filled with the electrolyte, the iron plates should be well scoured with sand and then with diluted sulphuric acid 1 in 40 of water (the acid should be poured in the water, not the reverse, or it may blow up, as heat is generated very rapidly). They should then be suspended in the bath as before described. The current is switched on to the extent of 6 ampères for the size given, and allowed to continue for three or four days. The terminals on the plates should be reversed in the morning and evening of each day, so that the plates alternately become anode and cathode.

The bath should now be in condition to deposit a good quality of iron. There will be on the surface a thick brittle scum, which must not be taken off.

Hydrogen will be given off at whichever plate is the cathode. The plate that is to be steel-faced takes the place of the cathode plate. The plate will usually be coated in about half-an-hour. If the plate does not cover with iron rapidly the plate is not properly cleaned, or the electrolyte is not properly saturated with iron.

Clean the plate that is to be steel-faced with washed chalk and plenty of water, then with diluted sulphuric acid, and then plenty of water, and place in the tank at once. To remove the old steel face, before steel facing again, wash in diluted sulphuric acid.

It may be noted here that most of the salts of iron can be used for depositing, but they must be made neutral.

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